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Descriptive Study of 30-15IFT TEST

at 2800 meters above sea level in professional football players.

The Bolivian Professional Football League currently has 12 teams of which 5 of them are located at an average altitude of 416 meters above sea level, the remaining 7 teams (cities, La Paz: 2, Potosi: 1, Oruro: 1 Cochabamba: 1 Sucre: 1) are between 2400-4090 meters above sea level, for example. In the city of Santa Cruz de la Sierra, which lies at 416 meters above sea level, in spring time the highest average temperature is 28 ° C being the lowest average of 18.5 ° C, while for the same period, for example in the city of Potosi where the city has an average altitude of 4090 meters above sea level the highest average is 15.5 ° C and the lowest average of - 2 ° C, having in turn a difference of minimum monthly temperature of nearly 20 ° C throughout the competition season.

The competition format is all against all in one local area presenting two annual tournaments, the duration of each tournament lasts about four months, in which the reprogramming of midweek games become frequent due to variables such as international friendlies (national team), local teams participating in international tournaments such as Copa Libertadores and Copa Sudamericana. All the above means that there are times in the season that the team plays up to 3 weekly competitions, with the mitigation that a team can play 2 games on the road and one at home, which means that within 48 - 72 hours, the team plays at 416 meters above sea level at an average temperature of 28 °C, then play at 3650 meters above sea level with an average temperature of 13 °C , to then finish as is the case of the team under study, to complete its third match at home at 2800 meters above sea level with an average temperature of 22 ° C.

The characteristics of the Bolivian Professional Football League, referring mainly to the amount of weekly games, travel overland as well as air, climatic differences, conditions the player abruptly to adapt to changes in height above sea level; a study by Brutsaert et al. (25) found that the metabolic profile of the footballer is already altered at moderate altitude (1600 m) compared to sea level. Players during a match in conditions of high altitude (more than 3000 meters) use about 70% of O2max (31) and its capacity is reduced by about 7% for every 1000 meters of ascent. Not only the average oxygen consumption is the only limiting factor in performance, but also the process of re phosphocreatine synthesis (PCR), after a high-intensity efforts, is affected due to the high altitude.

PCr represents the immediate substrate for ATP synthesis after a high intensity exercise, its ability to sustain intermittent exercise performance is affected by the availability of muscle PCr (31).
The kinetics of PCr resynthesis is sensitive to manipulation o2 available, which occurs during exercise at high altitude, then under condition of acute hypoxia, the resynthesis of PCr will be reduced, which will be a limiting potential intermittent exercise performance during a soccer match (31).

All the above makes the task of the fitness trainer to be of vital importance for the understanding and management of the most precious resource of training I think it is time, therefore the selection of the field test is a sensitive task that the fitness trainer must perform.

In past decades, there have been proposed numerous field tests to determine the Maximum Aerobic Speed (VAM) and therefore indirectly VO2max athletes (35-37).

These famous tests are based on linear continuous runs (35) or racing go and return (36; 38), and the maximum speed runs (MRSS) reached at the end of the tests (which are not far from the VAMs) is obtained through a different strain of the intermittent sports and forms of interval training sessions are scheduled.

Using this critical velocity maxima (VCM) in the field may be the first objective way to identify intermittent high-intensity running (4, 5, 28), but certain crucial physiological performance factors for intermittent efforts and return no They are assessed by these tests present.

How fit subjects flashing racing? How do they tolerate change direction when running at maximum speeds above? Since speeds return (36; 38) are lower compared to linear (1), the coaches have to turn to get the most appropriate reference speeds. Such conversion tables are based on theoretical data that do not maintain individual adjustment. Sometimes to get different players reach an internal load Similarly, a different percentage of the VCM continuous is used (external load), depending on how each athlete is adapted to the intermittent one run and on how each tolerates changes address. Unfortunately, these empirical manipulations decrease the accuracy of an exercise prescription.

In view of the defects of these field tests, a protocol that includes intermittent runs and runs back and forth simultaneously seemed necessary. A few intermittent field tests already exist, for example, the Yo-Yo test (33) and the Test of racing round the back Flashing (Intermittent Shuttle Test Run, SRT) (39), but they provide only an index of intermittent aerobic performance (30; 34). They do not give a maximum critical speed (VCM) can be used as reference speed for training purposes.

The 30-15 Intermittent Fitness Test (30-15IFT, 30-15 Intermittent Fitness Test), the reliability of which has already been shown (13), as an alternative to these other tests. Being intermittent and round, his main interest is that it involves similar to those requested during sessions of interval training round (i.e., explosive power of lower limbs when there are changes of direction, aerobic qualities physiological variables, and ability to recover between attempts or repetitions of exercises).

This allows players to reach a final maximum critical speed (VCM) (VCM30-15IFT) that is supposed to be more accurate to adjust interval training sessions back and forth a certain continuous VCM usual.

Purpose

Undertake a descriptive analysis of the implementation of the Test 30-15 IFT in professional soccer players as a valid tool in assessing intermittent resistance and subsequent prescription of training, a professional team that participates in international competitions such as Cup Sudamericana and Copa Libertadores de America, who live, train and compete in local status at 2800 meters above sea level, which is the first known study to date with these characteristics.

Objective

• Compare intra - subject the evolution of variables VO2 max. and final speed reached during the test 30-15 IFT over 4 months that the local tournament.

Equipment and Method

Subjects

The subjects covered by this study were 23 professional footballers (9 defenders, nine midfielders and five forwards, the goalkeepers were excluded) of which 18 were of Bolivian nationality, 4 Argentina and one Spanish. The average age was 24.55 ± 3.72 years, an average weight 72.22 ± 5.84 kg. And maximum oxygen consumption (VO2 max.) By 30-15 IFT's

proprietary formula of 49.16 ± 2.52 (ml.-1min.kg-1). They all have experience of at least 3 months in the 30-15 IFT test performance and all subjects were healthy at the time of the completion of that test.

Procedure

This study consisted of three evaluations performed with a gap of two months in which spanned half of preseason, middle and end of tournament (the last evaluation was conducted two weeks before the end of it). All of them were performed 65 hours after official matches except the match played in preseason where was held a friendly match with their own characteristics to an official meeting.

A recording test was used in 30-15 IFT .mp3 audio format in its English version assessments, was taken away by an odometer (the distance was corroborated with a tape of 50 meters.),

They were used three assistants (one assistant stood at 0 meter and second on the subway 40 to determine whether each player when the sound reached to touch the line and the third assistant was completing the return of stages of each speed dial for each null player) was the trainer who gave the instructions to the third assistant what was happening with each player.

In the three evaluations, we tried to reproduce the same conditions of training and warm-up, so as not to affect the reproducibility and not interfere with the planning done by the coaching staff.
All evaluations were performed at the stadium with natural grass at the same time of day (10 am), the average temperature was 17.63 ± 0.65 ° C.

Protocol

It consists of running for 30 seconds alternating with periods of 15 seconds of passive recovery. The rate is fixed at 8 km • h-1for the first race after 30 seconds and was raised 0.5 km • h-1 every 45 seconds.

The calculation of distances to train to run during each 30 second period took into account the fact that the effort to return (turn) is greater when the running speed is increased. an empirical value of 0.7 seconds during periods of career 30 seconds for each change of direction is used.

For example, 11.5 km • h-1, a cover 96 m in a race 30 seconds straight, but cover the same distance over a distance of 40 m round trip requires 2 changes of direction taking 2 x 0.7 seconds, which leads to a race distance corrected to 91.6 m.

The subjects had to run back and forth between two lines made 40 m, separated at a rate dictated by a pre-recorded sound at appropriate intervals that helped them adjust their running speed when entering areas three meters at each end and in the middle of the field while the shorter sounds (Figure 1) is played.

During the 15 seconds of recovery, subjects walk in the forward direction to join the next line. The test ends when a subject cannot keep running speed imposed or when the subject is unable to reach an area of 3 m around each line at the time of the audio signal 3 times consecutively. The velocity achieved during the last completed phase is taken as the VCM30-15IFT

Physiological Basis of Exercise / Pattern of Recovery

The respective durations of exercise and recovery periods were chosen with respect to most of the characteristics of intermittent sports (2; 29) according to various physiological considerations. About periods of exercise, 30 seconds is about the time kinetics cardiorespiratory response at beginning of year (26; 27) and is also the time that has been shown to deposits HbO2 are consumed during the year intense (41).

Since the rest, recovery of phosphocreatine reserves has been reported to be 20-30 seconds (31), 15 seconds of recovery allow sufficient recovery, but incomplete as energy substrates during intermittent games (2 ; 29).

Finally, compared to ISRT, the choice of distances

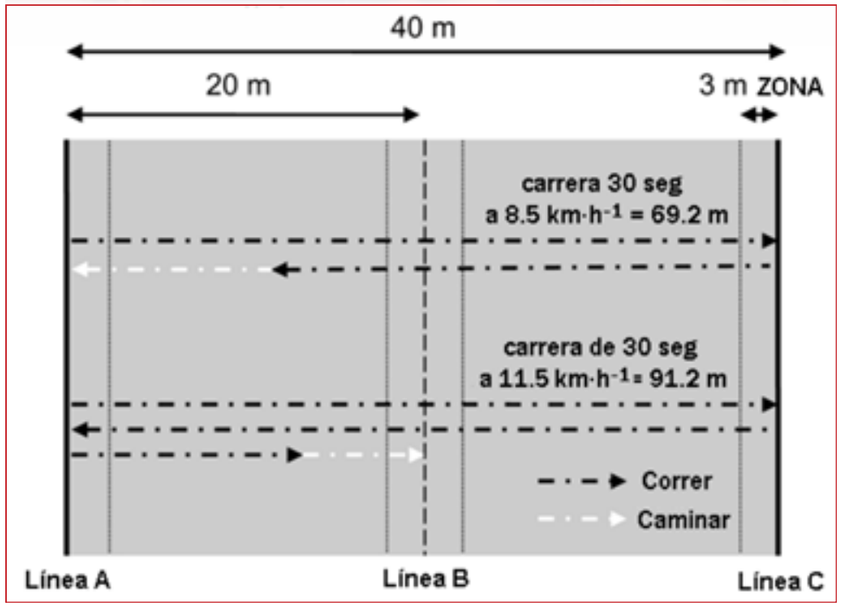


Chart No. 1. The area prepared for the 30-15 Intermittent Fitness Test (30-15IFT) and example 2 flashing racing area. For the race 8.5 km • h-1 (approximately 69.2 meters in 30 seconds), the subjects come on line A, run to the line C crossing the line B, and then returns. After crossing the line B again, they stop after 8.5 m walk to the line A during recovery from 15 seconds to be ready for the next phase. For the race 11.5 km • h-1 (approximately 91.2 meters in 30 seconds), the subjects come on line A, make a full turn, stop after 9.5 m to go to the line B, and then walk to the B during recovery line 15 seconds for the next outing. Note that the specific distances calculation takes into account the time needed for changes of direction.

longer round trip (40 m vs. 20 m) it is understandable to decrease the lactate (1) and perceived muscular pain in the lower limbs exercise, which helps to achieve one (higher than VAM) supramaximal VCM.

Statistical Analysis

The data presented were conducted by the IBM SPSS version 20 for Windows 7, 64 bit. A descriptive analysis using mean and standard deviation was performed.

The Kolmogorov-Smirnov test was used to determine the normal test also was also implemented the Z value for the variable VO2 max. and final speed test.

An analysis of variance (ANOVA) with repeated measure ($p \leq 0.05$) was used to determine the confidence interval on the variables VO2 max. and final velocity achieved, together with a pairwise comparison of the above variables. For all the statistical study the threshold of significance was $p \leq 0.05$.

	Average	Standard Deviation
Subjects (N)	23	
Age (years	24,55	± 3,72
Weight (Kg.)	72,22	± 5,84

Table Nº1, Characteristics of the sample used in the present study.

Results

The Kolmogorov-Smirnov test, presented a level of significance for the variable age of 0.599 and 0.893 for weight, therefore, the sample is adjusted to a normal population. Pairwise comparison of the variable VO2 max. Significance values were Test No. 1 (T1) - Test No. 2 (T2) of 0.067; Test No. 1 (T1) - Test No. 3 (T3) of 0.150; (T2) - (T3) of 1,000. Regarding the variable speed end, the significance values were Test No. 1 (T1) - Test No. 2 (T2) of 0.057; Test No. 1 (T1) - Test No. 3 (T3) of 0.104; (T2) - (T3) of 1,000.

The findings on the variable VO2max. No. 1 in the test I present an average of 48.03 ± 2.51 (ml.-1min. kg-1) with a confidence interval of 95% lower limit of 46.93 ml.-1min.kg-1 and upper limit of 49.11 ml. -1min.kg-1, Test No. 2 presented an average of 49.56 ± 2.33 (ml.-1min.kg-1), with a confidence interval of 95% lower limit of 48.57 ml.-1min.kg-1 and upper limit of 50.58 ml.-1min.kg-1. For Test No. 3 had a mean of 49.85 ± 2.76 (ml.-1min.kg-1), with a confidence interval of 95% lower limit of 48.65 ml.-1min.kg-1 and upper limit of 50.04 ml .-1min.kg-1.

Vo2 máx.	Media	Desvio Standard	Intervalo de confianza 95%	
			Límite inferior	Límite superior
1	48,03	± 2.51	46,94	49,11
2	49,57	± 2.33	48,56	50,58
3	49,85	± 2.76	48,66	51,04

Table No. 2: Comparisons of 3 evaluations performed on the variable VO2 max. The unit of measurement is ml.min.kg

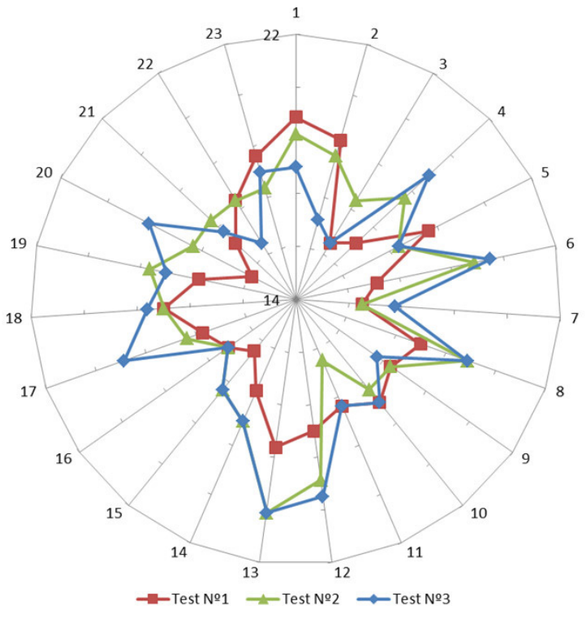
Regarding the variable final speed in the test No. 1, I present an average of 17.35 ± 1.07 km h-1 with a confidence interval of 95% lower limit of 16.88 km h-1 and upper limit of 17.81 km. h-1, Test No. 2 presented an average of 17.96 ± 1.11 km h-1, with a confidence interval of 95% lower limit of 17.47 km h-1 and upper limit of 18.44 km h-1 . For Test No. 3 I present an average of 18.04 ± 1.32 km h-1., With a confidence interval of 95% lower limit of 17.47 km h-1 and upper limit of 18.61 km h-1

Vel.Final	Media	Desvio Standard	Intervalo de confianza 95%	
			Límite inferior	Límite superior
1	17,35	± 1.07	16,88	17,81
2	17,96	± 1.11	17,47	18,44
3	18,04	± 1.32	17,47	18,62

Table No. 3: Comparisons of 3 evaluations performed on the variable VO2 max. The unit of measurement is km h-1

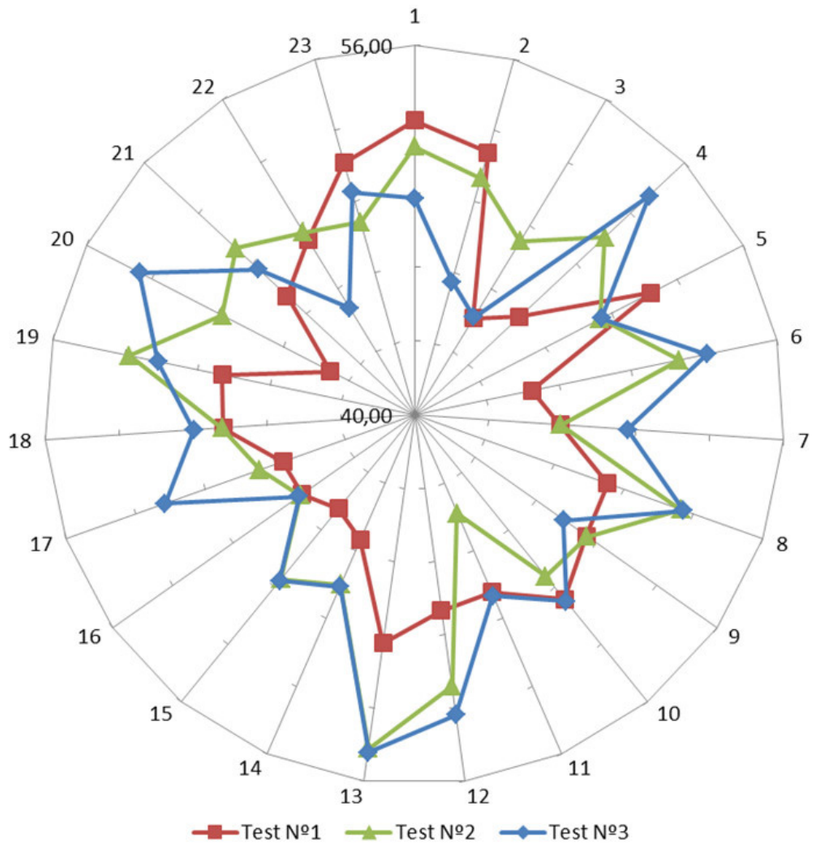
	Test Nº1				Test Nº2				Test Nº3			
	VM IFT	Edad D.	Peso	Vo2 Máx.	VM IFT	Edad D.	Peso	Vo2 Máx.	VM IFT	Edad D.	Peso	Vo2 Máx.
Sujeto Nº1	19,5	22,44	69,9	52,75	19	22,63	70,4	51,63	18	22,95	70,4	49,38
Sujeto Nº2	19	22,79	67,7	51,79	18,5	22,98	68	50,66	16,5	23,30	68	45,98
Sujeto Nº3	16	26,75	83,9	44,89	17,5	26,93	84,8	48,81	16	27,25	84,8	44,96
Sujeto Nº4	16,5	25,19	73,1	46,22	18,5	25,37	74,1	51,26	19,5	25,69	74,1	53,91
Sujeto Nº5	18,5	26,82	80,9	51,52	17,5	27,01	79	49,04	17,5	27,33	79	49,13
Sujeto Nº6	16,5	19,35	64,9	45,20	19,5	19,53	66,7	51,70	20	19,85	66,7	52,93
Sujeto Nº7	16	30,33	63,9	46,31	16	30,52	64,1	46,34	17	30,84	64,1	49,24
Sujeto Nº8	18	20,74	65,6	48,86	19,5	20,93	67,3	52,24	19,5	21,25	67,3	52,37
Sujeto Nº9	17,5	26,80	75,2	49,11	17,5	26,98	76,3	49,13	17	27,30	76,3	47,90
Sujeto Nº10	18	26,81	79,1	50,28	17,5	27,00	80,2	48,99	18	27,32	80	50,41
Sujeto Nº11	17,5	25,39	85,1	48,36	16	25,58	84,7	44,63	17,5	25,90	84,3	48,53
Sujeto Nº12	18	19,99	67,8	48,54	19,5	20,18	69,5	51,86	20	20,50	69,5	53,10
Sujeto Nº13	18,5	21,54	73,5	49,97	20,5	21,72	74,9	54,59	20,5	22,04	74,9	54,74
Sujeto Nº14	17	18,92	73	45,88	18	19,11	75	48,01	18	19,43	75	48,11
Sujeto Nº15	16	26,55	73,6	45,22	17,5	26,74	73,2	49,17	17,5	27,06	73,2	49,26
Sujeto Nº16	16,5	23,29	68,4	45,96	16,5	23,47	67,1	46,05	16,5	23,79	67,1	46,12
Sujeto Nº17	17	18,10	62,7	46,04	17,5	18,29	63,1	47,12	19,5	18,61	63,1	51,46
Sujeto Nº18	18	19,64	71,3	48,31	18	19,83	71,6	48,36	18,5	20,15	71,6	49,56
Sujeto Nº19	17	28,54	68	48,52	18,5	28,73	68,8	52,60	18	29,05	68,8	51,35
Sujeto Nº20	15,5	26,81	70,2	44,09	17,5	27,00	69,5	49,38	19	27,32	69,5	53,41
Sujeto Nº21	16,5	31,20	74	47,55	17,5	31,38	70,5	50,59	17	31,70	70,5	49,23
Sujeto Nº22	17,5	26,67	81	48,87	17,5	26,85	71,5	49,26	16	27,17	71,5	45,42
Sujeto Nº23	18,5	24,72	65,7	51,34	17,5	24,91	72,5	48,67	18	25,23	72,5	50,02

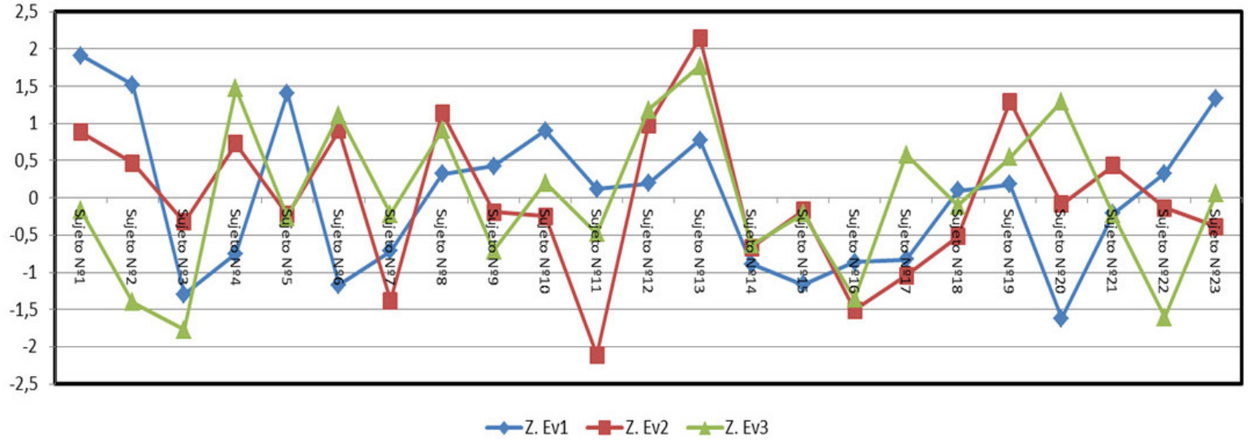
Table No. 4: Matrix data of the 23 subjects covered by this study, where you can observe the variables VM IFT (km h-1), which corresponds to the final speed test 30-15 IFT achieved by the subject, age D. (decimal old), weight (Kg.) and VO2 max. (ml.-1min.kg-1) that each subject has as a result of each test.



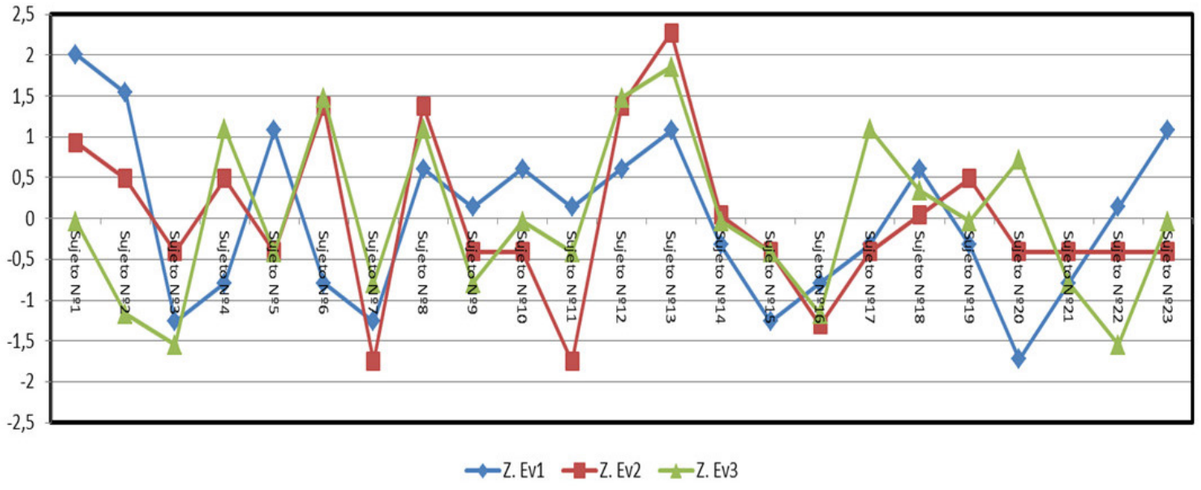
Graph 1: Radar graph for the evolution of the variable final speed achieved. Angular numerical values determine each subject under study. The radius (distance from the centre to the perimeter) indicates the variability reaches final speed (km h-1). The coloured rectangles indicate board behaviour during the Test No. 1, the green triangles show what happened in the Test No. 2, and blue diamonds teach what happened in the Test No. 3 during the making of the Test 30-15 IFT.

Graph No 2: Radar graph for the evolution of the variable V02 max .. The angle numerical values determine each subject under study. The radius (distance from the centre to the perimeter) indicates the variability of VO2 mx. (ml.-1min. kg-1). The coloured rectangles indicate board behaviour during the Test No. 1, the green triangles show what happened in the Test No. 2, and blue diamonds teach what happened in the Test No. 3 during the making of the Test 30-15 IFT.

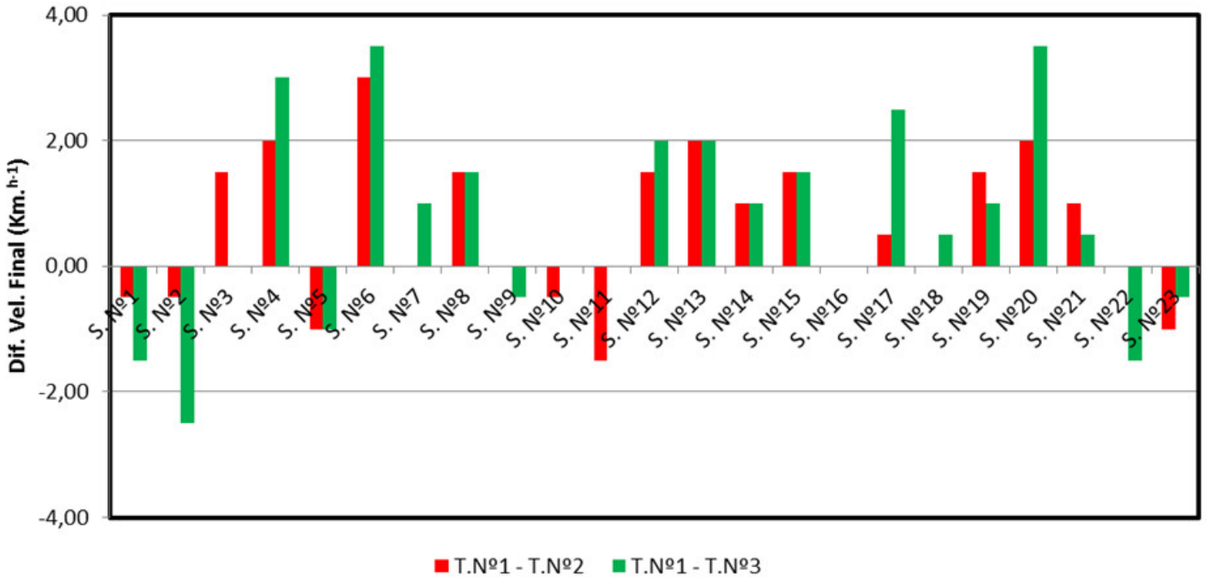




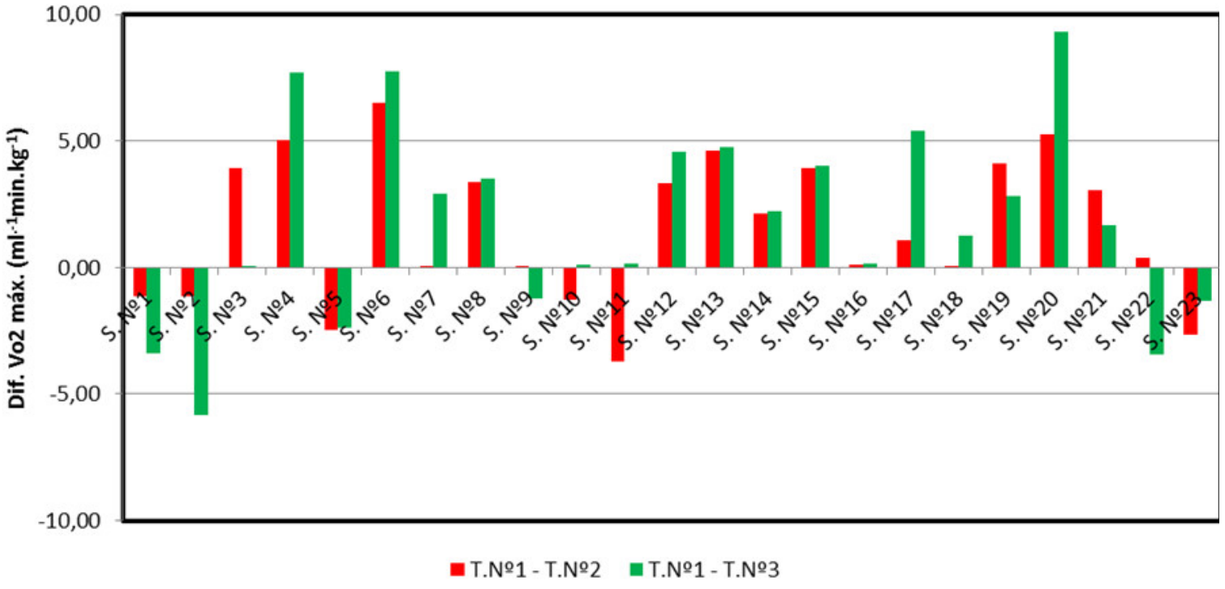
Graph No. 3: Comparison of evolution of each subject with Z value of the variable VO2max is observed. 3 samples during the 30-15 IFT.



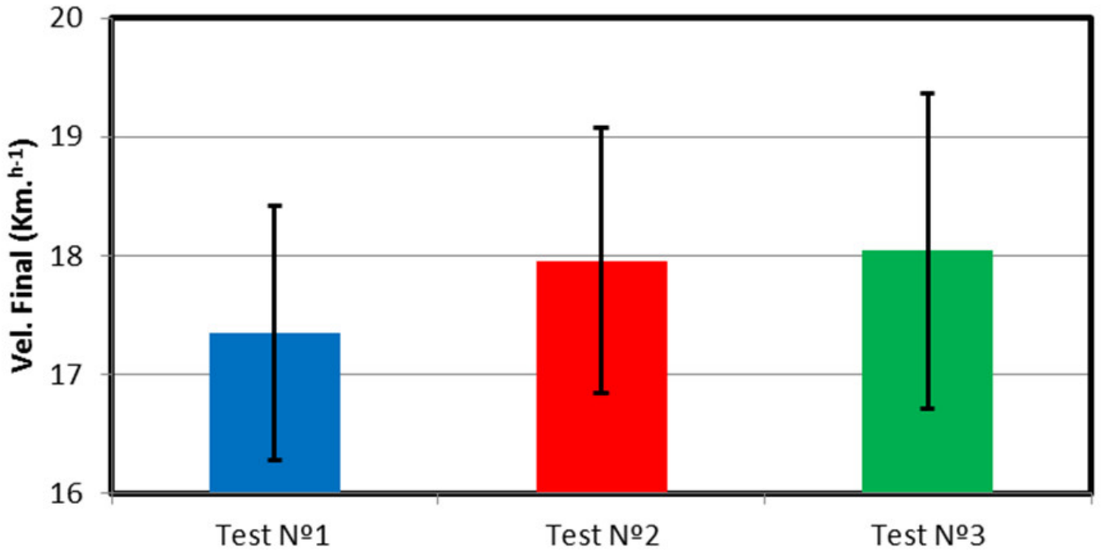
Graph No. 4: comparison of evolution each subject with its value of Z Vel variable are observed. Final for the 3 samples of 30-15 IFT.



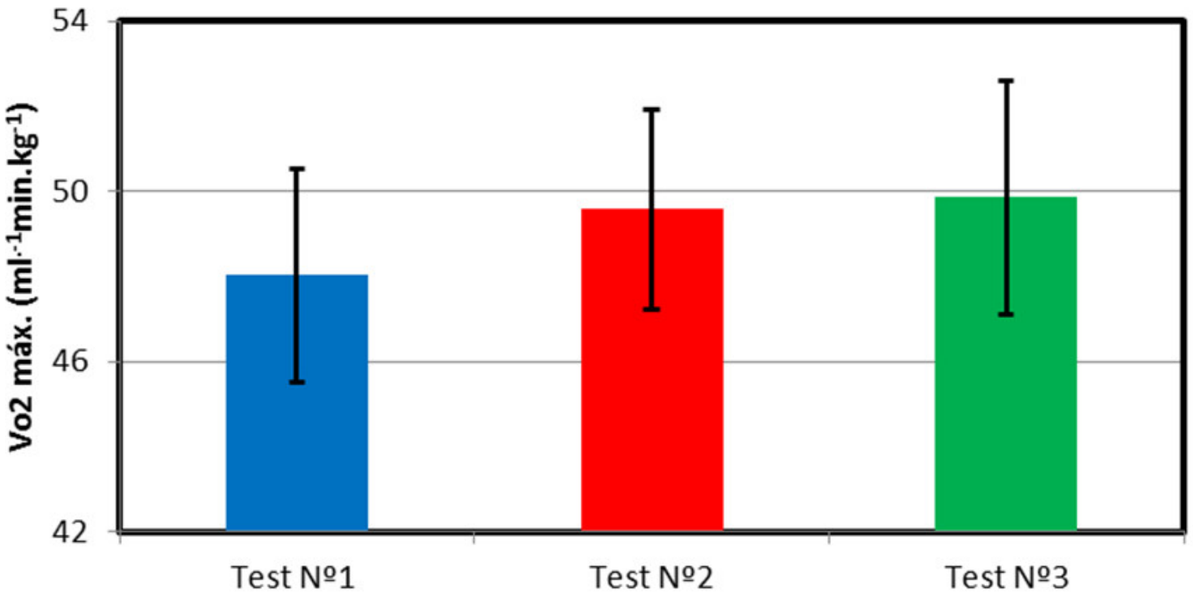
Graph No. 5: The graph shows the difference in the evolution of the final speed reached during the test 30-15 IFT between Test No. 1 and Test No. 2- Test No.1-Test No.3.



Graph No. 7: The graph shows the difference in the evolution of VO2 max. in the 30-15 test-IFT between the Test No. 1 and Test No. 2 & Test No.1-Test No.3.



Graph No. 8: Graph comparing the average with standard deviation for the final speed reached during the 30-15IFT test in the three tests taken.



Graph No. 9: Graph comparing the average with standard deviation for VO2 max in the 30-15 IFT test in the three tests taken.

Discussion

This study is the first to present to use the 30-15 IFT test in professional soccer players competing in local status at 2800 meters above sea level (masl) and during the course of the match from the 416 to compete the 4090 m.

An interesting point is to contrast the intermittent recovery test level 1 (YYIET1) with 30-15 IFT test (21) carried on under-16 players from the Iranian football league, in which the final speed values were obtained each test 14.9 ± 0.4 km h-1 (YYIET1) and 17.4 ± 1.1 km h-1 (30-15 IFT), comparatively, the values obtained from the above study are similar to those found in the present study, in addition to this, the author concludes that the YYIET1 is a test that your final velocity would be associated only with an index of intermittent aerobic performance (18; 21) and physical capacity assessed would be more related to intermittent aerobic endurance (18) as a balancing test IFT 30-15 indicating a speed that can be used as training prescription (21) and the physical quality evaluated would be associated with intermittent aerobic power (18).

It is worth noting the research proposed by Impellizzeri (29) where he used as a sample regional soccer players in Italian league, using the test the Yo-Yo intermittent endurance test level 1 and a direct measuring instrument (portable gas analyser K4b2, Cosmed) by an analysis of the variable VO2 max. reaching values of 50.17 ± 6.08 ml.-1min.kg-1

above sea level, associating positively to the values found in the present study 49.16 ± 2.52 ml.-1min. kg-1, this shows that the values obtained from indirectly (as test formula of 30-15 IFT) would be of no significant difference with the use of the instrument above although performed at 2800 meters above sea level.

The research shows more similarities as to the characteristics of the sample, flash test and cast the variable VO2 max to 3600 m with the present study, is that conducted by Aughey (13), wherein said values author, conducted an analysis variable VO2 max. 416 and 3600 m.s.n.m. acclimated in football players (Bolivianos, or natives living in the city of La Paz) and not acclimated (from Australia), 416 m players getting acclimated values of 49.85 ± 4.17 ml.-1min.kg-1 and non acclimated to 52.65 ± 4.15 ml.-1min.kg-1, then these subjects performed the same test at 3600 meters above sea level, players acclimated They presented average values of 43.58 ± 4.17 ml.-1min.kg-1 and non acclimated 41.87 ± 4.15 ml.-1min.kg-1, of the above can establish a positive association with the values of VO2 max. found in the present study.

One difference that is opposed, is the means and method of evaluation, in which a cycle ergometer according to the author the values obtained in cycle ergometer is usually lower (5%) using a treadmill was used because that is the cycle ergometer a rare form on the players. Besides this author found values between 56-69 ml.-1min.kg-1 elite players.

In future research we should investigate the correlation between the final speed test variables 30-15 IFT and the formula of VO2max. in the same sample at different altitudes above sea level.

Conclusions

The training conducted during the course of 4 months of the tournament, has allowed top speed monitor variables and VO2 max., In which the final speed reached as speed individually for training

prescription was used, from the statistically, the variable final speed test reached between the No. 1 and No. 2 test represented an evolution of 73.91%, comprising a total of 17 to 23 players, an involution of 26.09% covering only 6 players.

However, when making the percentage compared a different pattern to that performed above for the test no.1 and test No.3 where only improved 13 players (56.52%), 6 of them represented a decrease of 26.09% and the remaining was observed in April (17.39%) did not change between these tests coated.

Regarding the variable VO2max. between the test No. 1 and No. 2 test threw an evolution of 73.91% (17 of 23 players) and a regression of 26.09% (6 of 23 players), and for test No. 1 and No. 3 test represented the same behaviour, an improvement of 73.91% and decreased 26.6%.

The analysis can show that the condition in this study is consistent with high reliability and reproducibility given by the author of 30-15IFT test, Dr. Martin Buchheit.

From the point of view of practical application, the final speed test achieved under study is greater than I intermittent recovery test, as already explained in the discussion section, this allows the trainer individualize distances intermittent career in a more accurate way, as each individual has different metabolic profiles .

This study leads to the test 30-15 IFT is a laudable to intermittent running tests currently used in soccer fitness alternative, being a real possibility when the trainer can optimize the resource time, to improve the central and peripheral resistance.▪

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