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ORIGINAL ARTICLE

SELECTION PROCESS IN UNDER-17 SOCCER: CORRELATION AMONG PHYSICAL AND TECHNICAL ASPECTS

PROCESSO SELETIVO NO FUTEBOL DE CAMPO SUB-17: INTER-RELAÇÃO DOS ASPECTOS FÍSICOS E TÉCNICOS

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ABSTRACT
The purpose of this study was to characterize the physical and technical aspects of young soccer players, under-17 category, of Manaus city, Amazonas state, Brazil. The sample consisted of 33 male subjects, with average age of 15.27 ± 1.5 years. They were divided into four groups: G1 (defenders); G2 (fullbacks), G3 (midfielders) and G4 (strikers). The G2 had better results on the agility (11.2 ± 0.71 s), resistance (41.88 ± 3.18 ml.kg.min^{-1}) and kicking (65.60 ± 26.13 scores) tests, while the G3 was better on the speed (7.15 ± 0.46 s), passing (6.67 ± 2.27 points) and dribbling tests (16.35 ± 1.20 s) and the G4 achieved a good result on the vertical jump (48 ± 8.12 cm). It can be stated that the variables are not used as criteria for the selection of athletes and that there is a method of specific training for each game position.
Keywords: Soccer. Physical Fitness. Technical Aptitude.

INTRODUCTION

Soccer is considered one of the most popular sports in the world and, thereby, is the center of attention of thousands of spectators (SILVA et al., 1998). In Brazil, the practice of such modality presents an unquestionable popular appeal, generating a great emotional involvement (PEREIRA, 2004). The constant demands for results lead to the search for scientific basis toward the discovery of technological resources able to give support to a more intense advancement of the modality (CUNHA; BINNOTTO; BARROS, 2001). The focus of this search is, essentially, the high-performance soccer (SEABRA et al., 2001).

Regarding children and young soccer players, is noteworthy the lack of researches (SEABRA et al., 2001). Such fact does not seem to be very comprehensible, since the young athlete is in one of the first stages of his preparation and formation, which lead him to achieve a high performance in sports (SEABRA et al., 2001), and the development of the components of sports performance plays an important role in the teaching/learning/training process inherent to the formation of the subject. In this process, a conscious and systematic planning generates safe ways to the bio psychosocial formation of subjects that like sports practice and can aspire to become athletes or practice sports to improve his health potential or simply as a form of leisure ((MATTA et al., 1996).

Along with other sports, soccer is characterized for being an extremely complex sports modality, in whose practice there are combinations and interferences of various capacities acting together (SOUZA, 2006). Studies suggest that large part of the motor actions in the game is of low to moderate intensity; however, decisive moments are characterized by moves with much

power, speed and strength (ARNASON et al., 2004; BARROS; GUERRA, 2004; CAIXINHA et al., 2004; MUJIKA et al., 2000; BANGSBO, 1999; SHEPHARD, 1999; BANGSBO, 1994; TUMILTY, 1993).

Due to demands for results in soccer nowadays, there is an increasing search for scientific basis and discovery of new resources able to promote advances in researches and technologies that give support to the advancement of the modality (CUNHA et al., 2001). Because of such situation, it is common to observe coaches of lower divisions who use training and game methodologies exclusively directed to professionals. They do so in order to improve performance, but the strategy is fruitless, because the conditions are very distinct and the youths are under very different physical and motor conditions in comparison with adults.

In this context, the present study had three different objectives: 1) – to describe the characteristics of the physical and technical components of under-17 soccer; 2) – to compare these components regarding game position; and 3) – to propose an assessment and classification method for youths aged between 13 and 17 years old.

MATERIAL AND METHODS

Sample

This is a descriptive comparative research, with a sample composed of 33 young male athletes (59.35 ± 12.52 kg e 1.66 ± 0.08 m), aged between 13 and 17 years old, born between 1992 and 1996, belonging to clubs and schools of Manaus city. The criteria for selection were obtained through a questionnaire that sought to observe the type of attended school, the regularity of weekly training (2 to 3 days a week) and the length of the daily training, in hours.

The subjects were divided, regarding their game positions, into four groups: G1, defenders (n=9); G2, fullbacks (n=5); G3, midfielders (n=12); and G4, strikers (n=7). The teams were selected intentionally for having their own training center. All athletes participated voluntarily, but the ones responsible for them signed an informed consent, in accordance with the regulations of the Resolution 196/96 of the National Health Council on researches involving humans. The research project was previously approved by the Ethics and Research Committee of the Federal University of Amazonas (protocol CAAE n 0273.0.0115.00-09).

Collection procedures

After the inclusion of the subjects in accordance with the exposed criteria, they participated in three stages of the project: anthropometric assessment (body mass and height – 1st day); sequence A (2nd day) and sequence B (3rd day). An interval of 24 hours was adopted between the first and second stage, and of 48 hours between the second and the third ones. During the tests performance, there was rest of 3 to 5 minutes between the attempts and of 20 to 30 minutes between the tests. This control aimed to reduce muscle fatigue.

In order to avoid the influence of the performance order, in the day when the tests were carried out a crossover trial was adopted, in which, after random selection of the team that would be subjected to assessment, the tests were applied according to the sequence A-agility (shuttle run with ball), speed (50m) and pass, and the sequence B - lower limb power, kick, dribble and aerobic resistance; the second team would perform them inversely to the sequence.

Anthropometry

For body mass measurement it was used a 2096 pp digital scale (Toledo@ São Paulo, Brazil), with precision of 100g and, for height measurement, it was used a stadiometer with scale of 0,1cm (ALVAREZ; PAVA, 1999). Through the division of the body mass (kg) by the height^2 (m), the BMI (body mass index) of the young athletes was calculated.

Physical fitness tests

After performing tests of technical capacities and physical fitness the subjects performed exercises of warm-up and general stretching.

The agility was verified through the shuttle run test with ball (SRB), specific for soccer, proposed by Caicedo et al. (1993). In this test, after the assessor's whistle, the subject should go toward the first ball and lead it back to the place where it came from, return to take the other and leave it in the same point. The ball should be led next to the feet; kicking it was not allowed, and, when returning, it should stay motionless. Two attempts were made and the shorter time (seconds) was adopted as the final result. The distance between the lines was 9.14m.

The speed test was performed within the interval of 50m demarcated by cones. The starting and finishing occurred in the same way than in the agility test, they were carried out at the same soccer field and all subjects were oriented to run at the highest speed possible. In order to minimize errors of reaction time, the chronometer was activated when the foot touched the ground (within the running area) from the first stride, and it was stopped in the moment when the athlete crossed the finish line, according to the protocol proposed by Matsudo (2005).

To perform the test of lower limbs power (Sargent Jump Test), it was used a device with mobile shafts, fixed at a right angle to an adjustable tower, 150cm high, in which there was a a measuring tape with a descendent scale of 0,1cm. This first line had as a base a second tower, 200cm high, attached to the ground. To perform the test, initially, the total height was measured; then, the subject had two attempts to perform the counter movement jump. As a result, it was computed the jump in which the mobile shaft touched by the subject was closer to the tower that contained the measuring tape and, then, the value obtained was subtracted from the total height, in order to obtain the final value.

For the aerobic resistance test, the Cooper test was applied (12 minutes). The subjects performed a 12 minutes running in a field delimited by cones at each 50cm. Such performance occurred in accordance with the protocol by Matsudo (1987). From this test, VO2max (Maximal Oxygen Uptake) was verified, through the Cooper's formula, proposed by COOPER (1968).

Technical capacities tests

The battery of aptitudes and global skills tests in soccer (dribbling, passing and kicking tests) was carried out in accordance with the methodology proposed by Mor and Christian (1979).

To perform the passing test it was delimited a small mark, 91cm wide and 41cm high, with two cones and one wooden shaft limiting their height. The subjects made four attempts, at each cone, aiming to hit the ball into the goalpost. The cones were distributed into three different angles, at a distance of 14m, as shown in Figure 1. To obtain a greater precision, this study considered the attempts in which the ball should enter the cones and in which it should touch the cones and/or the wooden shaft and enter. For each hit one score was computed; the athlete could reach a maximum scoring of 12 scores.

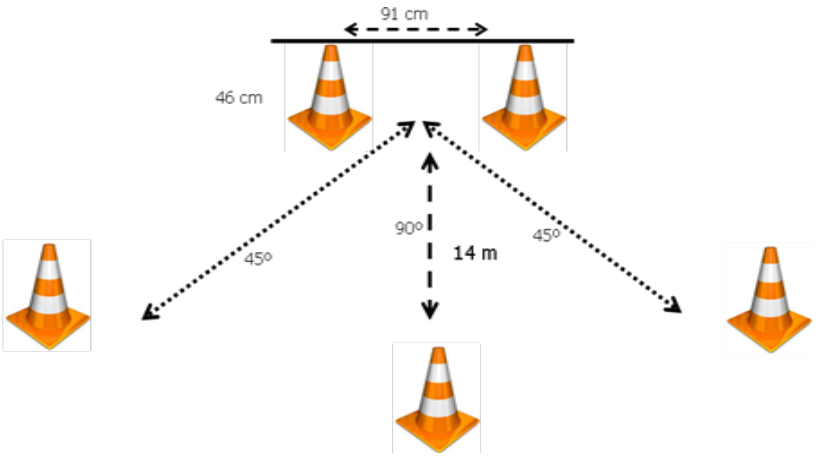

Figure 1 – Disposition of the elements for the passing test conception.

For the kicking test, a soccer regulatory mark (7.32 x 2.44m) was divided into areas of results by two cords attached to the crossbar, at 1.22m from each post of the mark, in such a way that the latter was divided into four scoring areas (1.20 each), as shown in figure 2. The subjects kicked a stationary ball with their favorite foot, in any point along the kicking line, at 14.5m; four kicks were performed in each scoring area. Before the beginning of the test, two kicks were performed for training. For each hit into the correct area, 10 scores were computed, and for each kick into the adjacent area (target area located above or below the intended area) four scores were computed. With the increase of the target, only the kicks that entered directly into the areas, without touching the cords, were considered.

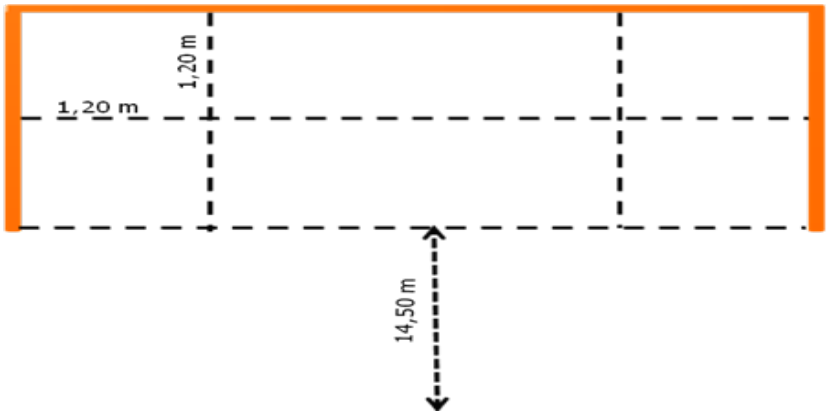

Figure 2 – Disposition of the elements for the kicking test conception.

The dribbling test consisted on the delimitation of a circular course with a diameter of 18.5, whose start/finish line, of 91.5cm, was traced at a right angle to the circle. A total of 12 cones, 46cm high, were put around the circle, at intervals of 45cm (Figure 3). The subject made three attempts to complete the course (in zigzag, around the cones): the first one in clockwise, the second one in counter-clockwise, and the last one in the direction the assessed player had chosen, prevailing as a result the average of the two shortest achieved times.

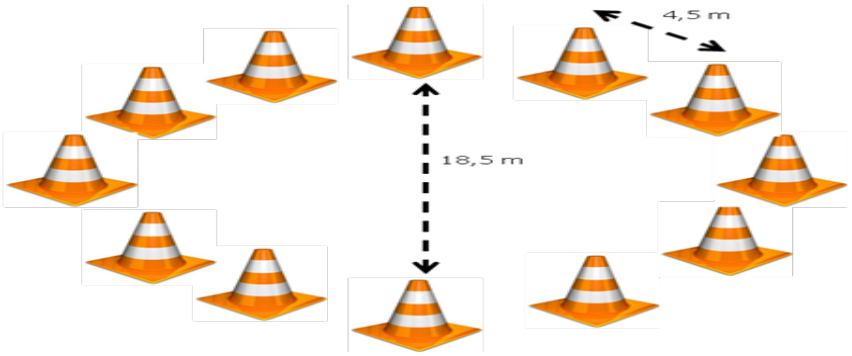

Figure 3 – Disposition of the elements for the dribbling test conception.

Performance classification and calculation

In order to obtain the classification, a quartile scoring table was created for the components of physical and technical fitness – Tables 1 and 2 - respectively. From this organization, it was possible to calculate the average performance, taking into consideration the weighted mean and multiplying the scores achieved in the scale in each test by the weight of the tests. Formula 1 was used to reach the average performance:

Formula 1: Average Performance = [2(Speed) + 2(agility) + 1(Vertical Jump) + 2(Vo2Max.) + 1(Pass) + 1(Dribble) + (Kick)]/10.

The option for increasing up to 2 the weight of speed, agility and Vo2Max tests was due to the fact that many references specialized in the area put these variables as very important points to the performance in the game (STROYER et al., 2004; BARROS; GUERRA, 2004; HELGERUD et al., 2001; SILVA et al., 1998; FELTRIN; MACHADO, 2009; REILLY, 1996), without counting with the decreased technical performance resulting from the low level of physical fitness.

Table 1 – Quartile of the physical indicators applied in under-17 youths (n=33)

Scores	Vertical Jump	Speed	Agility	Vo2 Máx.
1	28 – 43	8,75 - 7,6	12,93 - 11,78	21,11 - 34,51
2	44 – 47	7,53 - 7,18	11,75 - 11,32	35,29 - 41,02
3	48 – 52	7,16 - 6,87	11,31 - 10,56	41,17 - 42,99
4	53 – 59	6,87 - 6,37	10,47 - 9,82	43,06 - 49,98

Note: vertical jump (cm); speed (s); agility (s); Vo2Max (ml.kg.min $_1$)

Table 2 – Quartile of the physical indicators applied in under-17 youths (n=33)

Scores	Pass	Dribble	Kick
1	1 – 4	22,28 - 18,22	20 – 40
2	5 – 6	18,075 - 17,2	41 – 54
3	7 – 8	17,14 - 15,9	55 – 64
4	9 – 11	15,795 - 14,22	68 – 100

Note: pass and kick (specific scores of the tests); dribble (s)

Statistical treatment

The results were into a normal and homogeneous distribution, situations observed through the Shapiro-wilk and Levene tests, respectively. The variables were described by central tendency (mean) and dispersion (standard deviation), and the relationship among them was observed through the coefficient of variation (CV). The scoring tables were elaborated by obtaining the quartile of each test. The comparison among the means of the distinct game

positions was made through an Anova one-way, in which the significant differences were verified by a *post-hoc Scheffe.* The significance level adopted for all analyzes were processed through the *SPSS 14.0* statistical package for Windows.

RESULTS

The anthropometric assessment did not present any significant difference among the groups, whether regarding body mass, height or BMI (Table 3).

Table 3 – Values of mean (x) standard deviation (sd) and Coeficiente of variations (cv) of anthropometric variables

Antropometric Variables	**G1 (N= 9)** **x ± dp** **(cv)**	**G2 (N= 5)** **x ± dp** **(cv)**	**G3 (N= 12)** **x ± dp** **(cv)**	**G4 (N= 7)** **x ± dp** **(cv)**
Age	15,66 ± 1,22 (7,81)	15,2 ± 1,64 (10,81)	15,5 ± 1,62 (10,47)	14,42 ± 1,51 (10,47)
Body Mass (kg)	65,67 ± 10,93 (16,65)	53,99 ± 7,66 (14,2)	61,26 ± 12,93 (21,11)	52,06 ± 11,5 (22,09)
Height (m)	1,72 ± 0,05 (2,93)	1,64 ± 0,055 (3,38)	1,65 ± 0,081 (4,89)	1,655 ± 0,13 (8,35)
BMI (Kg/m2)	21,99 ± 3,1 (14,13)	19,99 ± 1,78 (8,94)	22,05 ± 3,21 (14,59)	18,74 ± 1,43 (7,67)

note: $p < 0,05$

For the physical (Table 4) and technical (Table 5) tests, it is observed a variation among the scores achieved for each group, but no difference among the players grouped by their origin position was statistically significant.

Table 4 – Mean values (x), standard deviation (sd) and coefficient of variation (cv) of the results of the physical tests

Tests	**G1 (N= 9)** **x ± sd** **(cv)**	**G2 (N= 5)** **x ± sd** **(cv)**	**G3 (N= 12)** **x ± sd** **(cv)**	**G4 (N= 7)** **x ± sd** **(cv)**
Speed	7,30 ± 0,427 (5,85)	7,32 ± 0,423 (5,77)	7,15 ± 0,46 (6,46)	7,47 ± 0,69 (9,32)
Agility	11,22 ± 0,82 (7,35)	11,2 ± 0,71 (6,41)	11,42 ± 0,81 (7,16)	11,43 ± 1,10 (9,68)
Vertical Jump	46,77 ± 6,51 (13,92)	46,4 ± 2,4 (5,19)	45,25 ± 7,36 (16,27)	48 ± 8,12 (16,92)
VO2 máx.	37,12 ± 6,76 (18,2)	41,88 ± 3,18 (7,61)	40,21 ± 7,28 (18,11)	32,21 ± 8,33 (25,86)

Note: vertical jump (cm); speed (s); agility (s); Vo2Max (ml.kg.min 1); $p < 0.05$.

Table 5 – Mean values (x), standard deviation (sd) and coefficient of variation (cv) of the results of the technical tests

Tests	**G1 (N= 9)** **x ± sd** **(cv)**	**G2 (N= 5)** **x ± sd** **(cv)**	**G3 (N= 12)** **x ± sd** **(cv)**	**G4 (N= 7)** **x ± sd** **(cv)**
Pass (0-12)	5,33 ± 1,32 (24,8)	5,60 ± 3,05 (54,45)	6,67 ± 2,27 (34,04)	4,86 ± 2,79 (57,53)
Kick (0-120)	57,78 ± 21,52 (37,25)	65,60 ± 26,13 (39,83)	49,67 ± 12,87 (25,91)	48 ± 18,9 (39,38)
Dribdle (s)	18,21 ± 1,36 (7,47)	16,87 ± 1,86 (11,04)	16,35 ± 1,20 (7,36)	18,77 ± 2,88 (15,35)

Note: $p < 0,05$. For passing and kick variables, the values in brackets represent minimum and maximum scores.

RESULTS AND DISCUSSION

The results obtained through the anthropometric assessment in the present study (59.41 ± 12.17kg e 1.67 ± 0.89) were lower when compared with those of the players of the same age group (70.38 ± 6.41kg and 1.73 ± 6.66m) observed in the study by Seabra, Maia and Garganta (2001), but they were equal to those found by Feltrin and Machado (2009), although their study has had as sample players of the under-15 category. These differences in relation to the other studies can be dependent on ethnic factors (GORDON et al., 1991), since the first one used Portuguese youths, and the second, youths from south Brazil. On the other hand, the defenders of the present study presented a higher mean than the other groups, regarding age (15.66 ± 1.22 years) and height (1.72 ± 0.05 m) variables. This can be explained by the fact that this position demands athletes with a higher physical development (CUNHA et al., 2001; BUNC; PSOTTA, 2001; WILLIAMS; REILLY, 2000).

As for the speed test, in general, the results (7.29 ± 0.49s) proved to be better than those found in the study by Seabra, Maia and Garganta (2001), (7.36 ± 0.35). When taking into consideration results according to game position, midfielders presented a better result (7.15 ± 0.46s) in comparison with the other groups, which is contrary to other studies (FELTRIN; MACHADO, 2009; RIENZI et al., 2000; EKBLOM, 1993; VAN GOLL et al., 1988), which state that midfielders and fullbacks are less fast than strikers and defenders, because when compared the displacement of players in the game, they verified that midfielders and strikers cover a distance about 5% longer than the distance covered by strikers and defenders. In this way, it is possible to affirm that a higher volume of running in collective and official games can result in functional adaptations expressed in differentiated values of anaerobic threshold ((BALIKIAN et al., 2002).

For the agility test, the overall result (11.33 ± 0.84s) proved to be better than the one found by Falk and Pereira (2009)), (12.42 ± 0.75 s) By the comparison among groups, although there was any statistically significant difference, it is possible to observe a better result for the G2 (11.2 ± 0.71s), while, according to Gil et al. (2007) and Feltrin; Machado (2009), strikers must have a better result for this test.

The lower limbs power (vertical jump test; 46.42 ± 6.59cm fit into the values considered regular for the age (JOHNSON; NELSON, 1979). On the other hand, despite the fact that there was no statistically significant difference among the groups, it was observed a better result for the G4 (48 ± 8.12cm), situation that can be explained by the fact that the striker athletes have a higher strength/power on the lower limbs, due to the specific characteristics of the position, that demands the performance of a larger number of repetitions of jumps and fast running within a short distance during the game, because strikers end or start counterstrikes, besides disputing many aerial moves ((FELTRIN; MACHADO, 2009).

According to Shepard and Leatt (1987), 88% of a soccer game involves aerobic activities, and the remaining 12%, anaerobic activities of high-intensity. Therefore, it is important to highlight the aerobic resistance test (12 minutes), through which it was possible to find VO2max values. The overall result (37.92 ± 7.46 ml/kg/min-1) prove to be lower than the standards for the age, according to Pitanga (2004). Among the groups there was no significant difference, but it is noteworthy that fullbacks (41.88 ± 3.18 ml/kg/min-1) and midfielders (40.21 ± 7.28 ml/kg/min-1) have higher aerobic potential when compared to defenders and strikes, which may be due to the specificities of these two positions, whose energetic solicitation is high and continuous throughout the game (SILVA et al.) 1998).

From the passing and kicking technical tests it was possible to observe, in all the groups, that the athletes achieved scores inferior to the maximum score of each test (table 5), except for the G3 (midfielders) regarding the passing (6.67 ± 2.27 scores) and dribbling (16.35 ± 1.20s) tests. Midfielders

were the ones to achieve the highest overall scoring, which can be explained by the fact that these players perform a larger number of passes, kicks and dribbles, since they, due to the role of disarming the adversaries and linking defense and strike, have a higher percentage of ball possession (CUNHA et al., 2001). Although there are not predefined references, it was expected that the athletes achieved a better result regarding the technical tests.

The geographical location of the places where the subjects were found limited the study, since only 24% of them trained in schools, while 76% did so in clubs around the city - which shows that the school organization does not favor the development of soccer, leaving it to the official clubs that not always have an adequate structure to give assistance, especially to the young player.

CONCLUSION

Before the homogeneous results found through the anthropometric assessment, regardless the role or game position, it is licit to conclude that these values, if taken in isolation, cannot be used as a single criterion for the selection of the athletes and, thus, should be associated with physical, technical and tactic components, which also have to be observed separately, since they show interdependence in the game performance. As for the results of the physical and technical tests, it can be stated that these values are not specifically trained for each position within the observed sample, and it is evident that other factors – such as social factors - are used as inclusion criterion in the projects.

Differently from several studies, as Feltrin and Machado (2009) and Gil et. al. (2007), there was no difference on the presented results among the groups, regarding position of role in the game. Supporting such assertion is the fact that differentiated training for each position, except for goalkeepers, was not adopted in the clubs the athletes of the present study belonged to; therefore, the found differences are probably justified by the overload provided by the games and collective training.

The analysis was focused on understanding the physical and technical indicators, attempting to reach a final result based on the association of variables of both tests. In this way, the assessment methods should present more specific parameter within the age group from 15 years, which will lead the coach to establish a characterization of his group, aiming to organize more precisely his methodology of training.

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