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ORIGINAL ARTICLE

Characterization of the intensity of effort of blind athletes from the Brazilian Football 5-A-Side national team

Caracterização da intensidade de esforço dos atletas cegos da seleção brasileira de futebol de cinco

Ramon Pereira Souza[1], José Manuel Vilaça Maio Alves[2], José Irineu Gorla[3], Giovanni Novaes[2], Soraia Izabel Correa Cabral[4], Eduardo Borba Neves[5], Claudio Diehl Nogueira[6]

1- Docente do Instituto Benjamin Constant e Sport Manager da modalidade Football 5-a-side do Comitê Organizador Rio 2016, Rio de Janeiro, RJ, Brasil. 2. Docente da Universidade de Trás-os-Montes e Alto Douro, Parque Desportivo da UTAD, Vila Real, Portugal. 3. Docente do Departamento de Estudos da Atividade Adaptada, da Faculdade de Educação Física da Universidade Estadual de Campinas (UNICAMP), Campinas, SP, Brasil. 4. Docente do Instituto Benjamin Constant (IBC), Rio de Janeiro, RJ, Brasil. 5. Docente do Centro de Capacitação Física do Exército do Instituto de Pesquisa da Capacitação Física (IPCFEx), Rio de Janeiro, RJ, Brasil. 6. Doutorando em Educação Física pela Universidade Estadual de Campinas (UNICAMP) e Coordenador da Classificação Funcional do Comitê Paralímpico Brasileiro (CPB), Rio de Janeiro, RJ, Brasil.

Abstract

Introduction: Football 5-a-side is a sport played by blind athletes that takes part in the Paralympic Games since 2004. The Brazilian national team is currently considered the best team in the world in this sport. **Objective**: To analyze the variations of intensity of effort (average per position and group average) made by blind athletes of the Brazilian football 5-a-side national team during six matches simulations. **Methods**: The sample on this research is the intentional type, made with eight blind male players, ages ranging from 21 to 30 years old (23.8 ± 3.3), all of them part of the Brazilian Football 5-a-side National team, which played in the 2012 Paralympics Games in England. In was evaluated the VO2máx and the heart rate during six simulations of official matches. **Results**: The intensity of effort of the blind athletes of the Brazilian Football 5-a-side National Team is intermittent and remains 52.5 % of the total time of a match (50 minutes) with an intensity of effort between the zone 2 (between threshold ventilation and respiratory compensation point) and the zone 3 (above the respiratory compensation point) averaging 89.8 % of the HR max. **Conclusion:** The intensity of effort is greater than the Football of 11 and, that in the Futsal players.

Keywords: : Football 5-a-side. Visually impaired. Heart rate.

Resumo

Introdução: O Futebol de 5 é um esporte praticado por atletas cegos, que participa das Paraolimpíadas desde 2004. A seleção Brasileira foi considerada a melhor equipe do mundo nessa modalidade entre os anos de 2004 e 2016. **Objetivo**: analisar as variações da intensidade de esforço (média por posição e média do grupo) realizados pelos atletas cegos da Seleção Brasileira de Futebol de 5 durante seis simulações de partidas oficiais (coletivos). **Métodos:** A amostra desta pesquisa é do tipo intencional, constituída por oito jogadores cegos do sexo masculino, com idades que variam de 21 a 30 anos (23,8±3,3) convocados para a Seleção Brasileira de Futebol de 5, que disputaram as Paraolimpíadas na Inglaterra em 2012. Foram avaliados o VO2máx e a Frequência Cardíaca durante as seis simulações de partidas oficiais. **Resultados**: A intensidade de esforço dos atletas cegos da Seleção Brasileira de Futebol de 5 é intermitente por permanecer 52,5% do tempo total de uma partida desta modalidade (50 minutos) com intensidade de esforço entre as zonas 2 (entre o Limiar Ventilatório e o Ponto de Compensação Respiratória) e zona 3 (acima do Ponto de Compensação Respiratória), atingindo uma média de 89,8% da FC máx. **Conclusão**: A intensidade de esforço é maior que o Futebol de 11 e, que no Futsal.

Palavras-chave: Futebol de 5. Deficientes visuais. Frequência cardíaca.

INTRODUCTION

The Football 5-a-side is a sport that caught attention of a great number of people after 1998, when the first World Championship was held in Brazil. This sport is practiced by visually impaired athletes and got some relatively importance when the Brazilian Football 5-a-side team won the three last Paralympics Games[1].

The visually impaired athletes who practice this sport belong to the B1 class (classification given by ophthalmologists classifiers of the International Blind Sport Association - IBSA) and may have only the perception of light[2].

During the practice of this sport, all athletes are required to wear an eye patch (made of gauze and tape) in the eye, reinforced with a blindfold so the visual condition is the same for everyone. However, the goalkeepers are exceptions, and they must be able to see normally[3].

A Football 5-a-side team consists of a goalkeeper, four outfield players, one coach and one caller. The coach and the caller are usually named guides, giving instructions to the outfield players. The Substitutions are unlimited during the match. The court measures 40x20m, and the surface can be hard (cement), wooden, or artificial grass. The game is split in two halves of 25 minutes each, in which 23 minutes are played consecutively (without interruptions) and the last two minutes of the 25

Correspondência: Ramon Pereira Souza. Instituto Benjamin Constant. Av. Pasteur, 350 / 368 - Urca - Rio de Janeiro - RJ - CEP: 22.290-240. E-mail: ramon@cpb.org.br

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minutes the clock stops every time the ball goes out of bounds. The game has a 10 minutes break at half time[2,4].

According to Morato (2007) the dynamic of the Football 5-a-side require from the blind athlete a good physical condition, and to be able to cope with constant acceleration, dribbling, sudden changes of direction and constant attention to the sound of the ball and directions of the guidelines (goalkeeper, coach and guide).

The Heart Rate (HR) analysis is influenced by factors such as age, sex, environmental conditions, hydration status and physical fitness, recommended to be determined by the percentage of HR max.[5]. Thus, this variable can be an ideal regulator to control the intensity of exercise football players according to their characteristics[6].

Considering the feature of the population practicing this sport and the restricted scientific literature about the intensity of effort (heart rate behavior) during the practice of the Football 5-a-side that supports the appropriate elaboration of a physical training plan for athletes, the goal of the present study was to analyze through the Heart Rate (HR) the changes of the intensity of effort (average by role in the field and group average) made by blind athletes of the Football 5-a-side Brazilian National team, over six simulations of official matches (training section).

METHODOLOGY

The sample is intentional, made of eight blind male players, with ages ranging from 21 to 30 years old (23.8 ± 3.3) all of them athletes of the Brazilian National Football 5-a-side team, which played in the 2012 Paralympics Games in England. The Brazilian team consists of ten players, eight blind players and two able players (the goalkeepers) that were not involved in this research.

All athletes were consulted on the participation in the study, as well as the assessments proposed by the study. All participant athletes signed the free and informed consent form. The opinion was adopted under the n. 019/2012, according to resolution n. 196/96 - CNS / MS.

Instruments

As to the anthropometrics features all athletes were subjected to the determination of body mass in Kilograms, being used a digital scale by the brand called Filizola®, after the height was measure using a 220 cm wall stadiometer estadiometro by WCS® with millimeters accuracy.

The body mass and height parameters were applied in determining the body mas. The heart rate was measured every 5 seconds, with direct information being sent to the Software located on the Internet (Polar® Personal Trainer). The data transmission from the monitor to the microcomputer was made using FlowLink interfaces index (IMC) by the equation: IMC = body weight / (height)^2.

For monitoring the respiratory gas exchange variables it was used the metabolic gas analyzer, by Med Graphics Cardiorespiratory Diagnostic Systems®, model CPX / D, from Medical Graphics Corporation, St. Paul – US and a treadmill by Quinton®, model K-65. For measuring the heart rate were used heart monitors by Polar® Ft 80 with the transmission through a soft tape around the chest (Wearlink transmitter)

Protocols

In terms of measuring the height, the athletes were in the standing position, where the measurement was made with them in an inspiratory apnea, in order to minimize possible variations on this anthropometric variable. The head was set at the Frankfurt Plane, parallel to the ground. The measurement was made with a cursor in a 90° angle relative to the scale. The athletes were barefoot.

In terms of the body mass the athletes were in a standing position, with the back turned to the scale, with the feet in a lateral distance and with the platform between his feet. The athletes used as less clothes as possible. The determination of these parameters followed the protocols described by Heyward and Stolarczyk (2000).

Prior to attending the treadmill Protocol (VO2max), the players remained in a standing still supine lay down position for 5 minutes, and then it was measured the heart rate. Then it was performed the spirometer test or cardiopulmonary maximum test where the HR was captured every five seconds.

According to the protocol Meyrs and Berlin (2000), for the spirometer test, his blood pressure was measured using the auscultation technic (twice) and HR was monitored through electrodes (Micromed®) placed in the notch, and in right and left iliac crest, with the athlete standing still on the treadmill.

The electrodes were connected to an electrocardiograph (Micromed®) and the HR values were visualized through the software Elite (Micromed Biotechnology®, Brasilia, Brazil). Right after, a metabolic gas analyzer was installed on the athletes, which collected gas samples and measured them every 5 seconds throughout the test.

The athletes were submitted to the ramp protocol[8] with an initial slope of 1% and increasing speed of 0.1 km/h every 9 seconds (0.667 km/h per minute). Prior to the exercise, there was a 3 minutes warm-up period at the speed of 7 km/h. The test started in the warm-up speed and was maintained until voluntary exhaustion. After having the group warmed-up (before the simulated match) the heart rate monitors were placed, together with the HR transmission tape.

The watch was fixed to his left wrist, covered by a strip. The elastic tape containing the transmitter was fixed around his chest, under his T-shirt. The athletes started the heart rate monitors synchronously at the time that the coach whistled to authorize the start of the simulated match. After the end of

matches the heart rate monitors and the tapes were collected for filing the collected data, following the protocol employed by Coelho et al. (2012).

Procedures

The Brazilian National Football 5-a-side team met seven times in 2012; in each time the period lasted for eight days. In each section the athletes performed physical, technical and tactical training. All training sections were held in the facilities of the Associação Niteroiense de Deficientes Físicos (ANDEF), located at the city of Niterói, Rio de Janeiro - Brazil.

Anthropometric data were first collected at the beginning of the season (first training section). The staff of the Adapted Physical Education Laboratory at the State University of Campinas (UNICAMP) performed the measurements.

At the second training section the athletes were submitted to the VO2 máx. test (ergospirometry). These tests were performed at the Psychobiology and Exercise Study Center (CEPE) thru the Encouraging Research Funding Association (AFIF), in São Paulo, during the morning section, from 09:00 am to 11:00 am, along two days, with a temperature range of 22°C to 24°C. One day prior to the tests the participants were not allowed to have any strenuous physical activity.

The study protocols for the $VO_{2\ max}$. followed the studies of Mana, Khana e Dhara, (2010); Macmilan et al., (2005); Marc Ardle, Katch e Katch, (2006); Wilmore e Costill, (2005) and Rampinini, Impellizzeri, Castagna, (2007), in terms of the analysis of the heart rate variation during the ergospirometry ($VO_{2\ máx}$.) test, discriminating from the Individuals Intensity Zones (IIZ) for the games during the training sections. The IIZ was divided into three different Intensities Areas according with the results: a) Zone 1: Lower Intensity of the Threshold Ventilation (TV); b) Zone 2: Intensity between the TV and the Point of Respiratory Compensation (PRC) and c) Zone 3: Higher Intensity of the PRC, accordingly the study of Lorenço et al. (2007), Coelho et al. (2012) and Coelho et al. (2012).

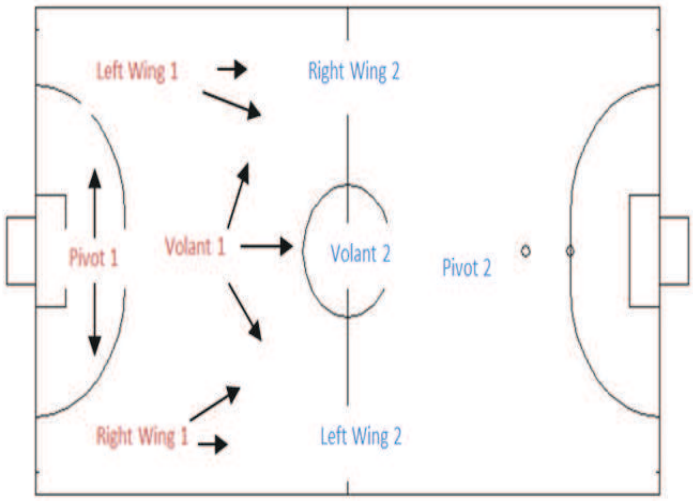
At the third training section, games (simulations) were organized to monitor the Cardiac Frequency (CF). All games (simulations) were performed at the synthetic grass field at ANDEF, from 3:00 pm to 5:00 pm with temperate from 22°C to 25°C and relative air humidity of 55%+/-4. The use of frequency meter during the matches was based on Amorim and Gomes (2013) and the American College of Sports Medicine (ACSM, 2005). The frequency meter was started before the beginning of the each game and was not turned off during break time. However the data recorded during this period were not used.

The Brazilian National Football 5-a-side team was split into two teams (the starting lineup team and the substitution team) where six training sections took place (between the third and the fifth meeting). The games, during these training sections were played strictly by the world's rules of IBSA with a 10 minutes technical break at each half time. It is important to say that the Brazilian National Football 5-a-side team is considered "the gold standard" in the scientific community, much more because of results achieved in this last Paralympic Cycle (2009-2012); South American Champion – 2009, World's Champion – 2010, Para Pam American Champion – 2011 and Paralympic Champion – 2012.

The Brazilian Team Playing System

The most adaptable tactical system played by the Brazilian National Football 5-a-side team, and the one the was most played during this Paralympic Cycle (2009-2012) was the system 1-1-2, also called the "Y" System, showed in this figure below[3].

Figure 1: Football five a side court with the tactical formation



Data Analysis

To analyze the data information, some procedures were taken:

The athletes were fit into three intensity zones, according to the ergospirometry test: Zone 1: bellow the respiratory threshold; Zone 2: between the respiratory threshold and the Point of Respiratory Compensation and Zone 3: above the Point of Respiratory Compensation.

The analysis of the intensity of effort during the six games (simulations) using HR monitors, verifying the average and standard deviation by position and team.
Finding the average and how long lasted the standard deviation in each intensity zone during the simulations, by: Player, position (defender, midfielder, right winger and left winger) and team, with the help of HR.

Statistics Treatment

The analysis of all data was made using the software package

used for statistical analysis. "Statistical Package for the Social Sciences, SPSS Science, Chicago, USA" version 20,0. It was made an exploratory analysis of all data to classify the different values of variables when it comes to main tendency and dispersion.

All variables were subject to a graphic observation (Boxplot) with the objective of detecting the existence of outliers and possible addition of incorrect data. The SPSS made the identification of outliers according to the boxplot graph construction criteria (based on interquartile range and the distance of the results to the 1st and 3rd quartiles). The averages and the respective standard deviations were calculated in the descriptive statistics analysis for each variable.

With the intention of making an analysis using statistical inference, it was necessary to evaluate the normality of the distribution of the obtained data.

In order to perform the analysis of inferential statistics, it was necessary to evaluate the normal distribution of the data collected. Thus, taking into account the biological nature of measures to be performed, an analysis was made of the type of distribution using the Shapiro-Wilk test. It was also assured and tested sphericity of the variance and covariance through the Mauchly test. It was used to compare means of the variable under study between the different games (simulations) and teams. A repeated measures ANOVA with a model (2 teams x 4 positions X 6 games), with a post-hoc Bonferroni. The significance level was kept at 5%.

RESULTS

The anthropometric profile of the players of the Brazilian National Football 5-a-side team in 2012 by position is shown in Table 1 with the mean and standard deviation results.

Table 1. Average between anthropometric measures of the players by position.

Pos.(n)	Age (years)	Sta. (cm)	BM (Kg)	BMI	FM (Kg)	FFM (Kg)
Pivot (2)	24,8 ± 2,5	1,86 ± 3,4	76,34 ± 1,67	22,1 ± 1,2	10,95 ± 0,12	65,39 ± 1,1
Volant (2)	29,9± 0,5	1,68± 0,07	74,2 ± 2,3	25,6 ± 0,4	10,75 ± 0,23	63,45 ± 1,4
R. Wing (2)	23,8± 1,5	1,68± 0,04	66,67± 1,2	23,6 ± 1.3	5,84 ± 0,6	60,83 ± 1,2
L. Wing (2)	21,8± 0,5	1,71± 0,01	71,5± 3,2	24,5 ± 0,3	9,75 ±0,6	61,75±0,5

Pos – position; Age – years old; Sta – stature; BM – Body Mass; BMI – Body Mass Index; FM – Fat Mass; FFM – Fat-Free Mass

Table 2 shows the data for the spirometer testing. It was found that the best results of VO2 max. were the Pivot 2 position player (59.4 ml/kg/min-1) and the worst was the Volant 2 (44.6/l/kg/n-1). The highest max FC was the Left Wing 1 (204 bpm) and the lowest was the Pivot 1 (193 bpm) (Table3).

According to the spirometer test data the players were set in three intensities zones presented in Table 4.

Table 2. Results of the spirometer test.

POS	HR.01	TMS.01	Vo2.01	HR.02	TMS.02	Vo2.02	Max.HR	Vo2 Max.
Pivot1	163	10	34,9	187	15	48,8	193	52,4
Pivot 2	183	13	50,8	192	16	56,4	198	59,4
Volant 1	164	11	34	184	17	46	190	46,6
Volant 2	172	11	37,5	188	14	42,7	191	44,6
L. Wing 1	175	12	41,2	183	14	49,4	204	57
L. Wing 2	163	11	45,6	173	14	54,5	196	59,3
R. Wing 1	180	12	47,3	192	16	51,8	198	52,4
R. Wing 2	150	10	36	178	15	51,8	199	53,2

POS – Position; HR.01 – Maximum heart rate at the Threshold Ventilation I (bpm); TMS.01 – Treadmill speed at the Threshold Ventilation I (Km/h); Vo2.01 - Oxygen Consumption at the Threshold Ventilation I (ml/kg/min^{-1}); HR.02 - Maximum heart rate at the Threshold Ventilation II; TMS.02 - Treadmill speed at the Threshold Ventilation II (Km/h); Vo2.02 - Oxygen Consumption at the Threshold Ventilation II (ml/kg/min^{-1}); Max.HR - Maximum heart rate (bpm); Vo2 Max. - Maximum oxygen consumption (ml/kg/min^{-1}): Z1 (Zone 1); Z2 (Zone 2); Z3 (Zone 3).

Table 3. Results of the Ergospirometry Test (by position).

Pos.	Fc 01	V. Es.01	Vo2 01	Fc 02	V.Es. 02	Vo2 02	Fc Máx.	Vo2 Máx.
Pivots	173±14,1	11,5±2,1	42,8±11,2	189,5±3,5	15,5±0,7	52,6±5,3	195,5±3,5	55,9±4,9
Volants	168±5,6	11±0	35,7±2,4	186±2,8	15,5±2,1	44,3±2,3	190,5±0,7	45,6±1,4
L. Wings.	169±8,4	11,5±0,7	43,4±3,1	178±7	14±0	51,9±3,6	200±5,6	58,1±1,6
R. Wings.	165±21,2	11±1,4	41,6±7,9	185±9,8	15,5±0,7	51,8±0	198,5±0,7	52,8±0,5

POS – Position; HR.01 – Maximum heart rate at the Threshold Ventilation I (bpm); TMS.01 – Treadmill speed at the Threshold Ventilation I (Km/h); Vo2.01 - Oxygen Consumption at the Threshold Ventilation I (ml/kg/min^{-1}); HR.02 - Maximum heart rate at the Threshold Ventilation II; TMS.02 - Treadmill speed at the Threshold Ventilation II (Km/h); Vo2.02 - Oxygen Consumption at the Threshold Ventilation II (ml/kg/min^{-1}); Max.HR - Maximum heart rate (bpm); Vo2 Max. - Maximum oxygen consumption (ml/kg/min^{-1}): Z1 (Zone 1); Z2 (Zone 2); Z3 (Zone 3).

Table 4. Mean and standard deviation for each intensity zone by position.

Zones	Pivot	Volant	Left Wing	Right Wing
1	<173 ± 14,1	<168 ± 5,6	<169 ± 8,4	<165 ± 21,2
2	174 ± 14,1 a 189,5 ± 3,5	169 ± 5,6 a 186 ± 2,8	170 ± 8,4 a 178 ± 7	166 ± 21,2 a 185 ± 9,8
3	>190,5 ± 3,5	>187 ± 2,8	>179 ± 7	>186 ± 9,8

Table 5 shows the variation of the average values of HR during 6 separate games, considering the player's position and the Maximum Heart Rate Percentage. The Left Wingers were the ones who performed the highest average in these games (172.9 ± 3.8 beats/min) and the Pivots were the ones who performed the lowest average (162 ± 3.2). The Right Wingers were the ones who performed the highest results of HR percentage in relation to maximum HR max (91.2 ± 2.4%).

Table 5. Average HR in each position during the 6 separate games.

Pos.		Game 1	Game 2	Game 3	Game 4	Game 5	Game 6	HR a±sd	a±sd % of HR
Pivot (2)	Beat/min %	160±3,6 81,5±2,1	161,9±3,6 82,12±1,59	162,15± 82±1,4	162±3,4 82±1,4	163,1±2,6 82,7±1	163±2,8 83,1±3,3	162 ± 3,2	82,1 ± 1,5
Volant (2)	Beat/min %	167,6±2,4 87,5±2,1	169,4±4,1 88,1±2,9	169,6±2,6 89,3±2,3	170,5±2,4 89,5±2,1	171,2±2,4 90±1,4	170,7±2,1 90±1,4	169,7 ± 3	89 ± 2
Right Wing (2)	Beat/min %	171,1±3,9 91±1,4	171,8±4,8 91,1±1,5	172,2±4,4 91,3±2,3	171,5±4,8 91±2,8	172,5±6,2 91,3±3,3	172,5±4,7 91,3±2,3	171,9 ± 3,8	91,2 ± 2,4
Left Wing (2)	Beat/min %	172,8±4,1 91±1,4	172,8±4,1 91,1±1,5	173±3,1 91±1,4	172,5±3,8 90,5±2,1	173,6±2,1 91,5±2,1	173±3,4 90,8±1,6	172,9 ± 3,8	89,7 ± 1,7

Pos. – Position; HR a±sd – average of Heart Rate and the standard derivation; a±sd %of HR - percentage of the Heart Rate and the standard derivation

Table 6 shows for how long Pivot players (0,3 min) and Right Wings players (10,5 min) stay in Zone 3. Volant players stay for a longer time (26,2 min) in Zone 2. Regarding Zone 1 it is possible to observe that Pivot players stayed for a longer time in this zone, as well, the whole team.

Table 7 shows a brief of the anthropometric characteristics found from different research that evaluate athletes from regular football

Table 6. Average and percentage time per intensity zone in all 6 games per position within the 50 minutes game time.

Zones / positions	Pivot	Volant	Left Wing	Right Wing	Team
1	41,4 / 85%	18,1 / 36,5%	12,2 / 22,2%	23,2 / 46,9%	23,9 / 47,5%
2	6,9 / 14,4%	26,2 / 53,3%	27,9 / 57,9%	16,1 / 32,1%	19,7 / 38,5%
3	0,3 / 0,6%	5,3 / 10,2%	9,9 / 19,9%	10,5 / 21%	6,4 / 14%

Table 7. Systemic Framework of the Brazilian National Football 5-a-side team Anthropometric Measures.

Authors	Level	N	Age	Height (cm)	BMI	BM (kg)	FM (%)
Rienzi, Reilly, Carter, Martin. (2000)	Professional	11	26,1±4	177±6	24,3	76,4±7	10,6±2,6
Al-Hazzana et al (2001)	Professional	154	25,2±3,3	177,2	23,3	73,1±6,8	12,3±2,7
Casajús (2001)	Professional	15	26,3±3,1	180±7	24,1	78,5±6,4	8,2±0,9
Balikian, Lourenção, Ribeiro, Festuccia, Neiva (2002)	Professional	25	22,1±8,3	179±7	23,7	76,1±9,8	12,2±3,6
Da Silva, Fernandes, Fernandez (2011)	Juniors	16	17,4±0,9	171,8±5,6	22,6	66,1±5,8	15,5±2,6
Lima, Silva, Souza, (2005)	Professional	13	18,6±1,9	177,1±3,5	21,7	68,5±9,5	11,2±1,6
Leal (2005)	Juniors	17	17,4±0,9	171,8±5,4	22,6	66,1±5,6	7,4±4,5
Castagna, Belardinelli, Impellizzeri, Grant, Coutts e D'Ottavios. (2007)	Youth	15	16,6±1,2	176±1	21,6	67,1±8,9	10,3±1,1
Ferreira, Gomes, Ferreira, Arruda, França (2010)	Professional	23	27,1±3,6	175±6,7	23,5	72,7±12,6	12,2±0,6

N – Sample number; BMI – Body Mass Index; BM – Body Mass; FT (%) – Fat Mass Percentage

DISCUSSION

Despite Football 5-a-side is still not well known worldwide, the sport is growing throughout the Paralympic Movement due to its dynamism and ability of the players. Some players stand out for their skills in their clubs and in the Brazilian national team, with anthropometric measurements very close to professional football and futsal players. There are two players in the sample from this research who were the world's best players in 2006, 2008, 2010, 2011 and 2012, the Parapan Championships, World Championships and Paralympics Games.

According to the results from Table 7, the anthropometric measurements of the Brazilian National Football 5-a-side team are similar to professional regular football players. In the same table, the mean values of the BMI from the Brazilian National Football 5-a-side team players are 23,9 with a standard deviation of ± 1.4. Professional regular football players and juniors players show a mean and standard deviation of 23 ± 0.6 with very close results between the groups.

The Brazilian National Football 5-a-side team players have a stature average of 174,2+/-0,1 cm. Comparing with Regular Professional Football Players which ones present a stature average of 178,5+/-1,6 cm and with Youth/Junior Football Players which ones present a stature average of 174,3+/-0,5 cm, the sample used in this study is closer to the Youth/Junior Football Players instead to the Regular Professional Football Players.

The Brazilian National Football 5-a-side team players have an average of body mass of 72,1+/-4,1 Kg. They were 4 Kg less when comparing with Regular Professional Football Players. When compared to Youth/Juniors Football Players, the Brazilian National Football 5-a-side team players are 4,3 Kg higher.
In terms of Fat Mass (FM) the Brazilian National Football 5-a-side team players obtained an average of 9,3+/-2,3 Kg. When compared to Regular Professional Football Players the Football 5-a-side players were 2,4 Kg lesser and when compared to Youth/Juniors Football Players the Football 5-a-side players were 2,3 Kg lesser also. These data point out that Football 5-a-side players present less FM than other level of Football players, but still in the sport's standard for this variable[29].

It was observed in the present study no significant differences in VO2 max values between players and positions. These results lead to deduce that the fitness level of all players was analyzed similarly. This relationship of the results of cardiopulmonary exercise test and the physical preparation was investigated by Castagna, Berlardinelli, Impellizzeri, Grant, Coutts and D

Ottavios, (2007), measuring how much better the test results, the better the fitness.

VO2max. among football players in 5 oscillated between 44.6 and 59.4 ml / kg / min-^{1}, with an average of 52.8 ± 4.2 ml / kg / min-^{1}. These results demonstrate that the players of this type presented lower values than those cited by Nunes, Almeida, Santos, Nogas, Elsangedy, Krinski e Silva (2012) for soccer players, also confirmed in the study Castagna, Impellizzeri, Cechini, Rampinini and Alvarez (2009) and also not being higher than the athletes of 11 semi Football Barbero Álvarez professionals in research, Soto, Barbero-Alvarez, Granda Vera (2008).

In the study of Barbero-Alvarez, D'Ottavio, Granda and Chestnut (2009) and Tonnessen, Hem, Leirstein, Haugen, Seiler (2012), results were found between 62.9 and 63 ml / kg / min-1 in Regular Football players. Thus, 5 a side Football players results are smaller than those of Regular Football and can say they are better conditioned. This fact may be due to the size of the pitch and the higher playing time in Regular Football.

However, the size of the Futsal court is no different to the 5 a side Football, being close to the playing time. The VO2 max values. were higher, observed by Nunes et al., (2012), may be related to the intensity of matches, with minors in 5 a side Football compared to the Futsal. Many blind players slow down and / or move with little speed in order to locate and / or hear the ball in the court. This dynamic is different from the Regular Football, where players keep a fast pace for much of the time[26].

As have described Krustrup, Mohr, Ellingsgaard, Bangsbo (2005); Castagna et al, (2007).; Alvarez Barbero, D'Ottavios, Granda Vera Castagna (2009); Barbero Avarez, Soto, Barbero-Alvarez and Granda-Vera (2008); Casamichana and Catellano, (2010); Bertolaccini, Orsatti, Barbosa Neto, Mendes, Penafote, Go, and Mota Lopes (2010); Castagna, Impellizzeri, Chaouschi, Bordon and Manzi (2011); Da Silva Fernandes, Fernandez (2011); Makaje, Ruangthai, Arkarapanthu, Yoopat, (2012) and Coelho et al., (2012) on Regular football and Futsal, setting these out as intense and intermittent because of the reach of HR above 90% HR max. The 5 a side Football reached in the first half the percentage of 90% and in the second half 93% HR max. and can be considered, according to the authors above, as a sport that requires intermittent efforts, of varied extension and random periodicity. The fact of the HR reach above 90% does not mean that the 5 a side Football keeps this intensity during the same time as the Regular Football and Futsal.

When 5 a side Football is analyzed according to the positions it was found that the wingers had average heart rate and the percentage of the HR max. greater than the whole group and therefore increased these percentages team. The function of these positions is to fight and attack, although act of the center line to the opponent's goal but fight your opponent and attack dodging thereof, mainly driven by auditory sense, with the ball between the legs in order to make the goal, detailing the information of your coach and the caller, raising the degree of difficulty and consequently HR in relation to Fixed and Volants, which control and distribute the ball to the Wingers, not corresponding to an increased of HR directly correlated with the movement on the court but with the physiological requirements of other variables (auditory sense, tactile sense, spatial orientation), as demonstrated in this study. A Regular Football and Futsal player does not use them with the same intensity as a blind player When analyzing according to the positions it was found that the Wingers had average heart rate and the percentage of the HR max. greater than the whole group and therefore increased these percentages in the team.

When analyzing the average time zones intensities for position during every game in the 50 minutes, the study revealed that most Pivot players stayed in Zone 1 with 41.4 minutes representing 85% of the time and the least were the wingers with 12 2 min. representing 22.2% of total time. In zone 2 the Volants stayed longer with with 26.2 min. representing 53.3% of the time and in zone 3 right wingers stayed the longer with 10.5 min. representing 21% and the lowest time was reached by the Pivots with 0.3 min. representing 0.6% of the total game time.

These results coincide with the times obtained in the studies of Barbero-Alvarez, Soto and Alvarez Barbero Granda-Vera (2008); Catagna, Impellizzeri, Cechini, Rampinini and Alvarez (2009); Goncalves, (2013) and Coelho et al. (2012), where the attackers to achieved higher intensity during the game, and a small recovery time between a stimulus. The data from this study where the prevalence of the Pivots in zone 1, the Volants in zone 2 and the wingers between zones 2 and 3, can be justified by the function performed during the game according to the tactical scheme of the Brazilian national 5 a side football team.

The Pivot player is the last team player being dribbled and moves little, although fighting his opponents with intensity, justifying the higher time in Zone 1. The Volant players attack the players much of the time, surrounding opponents and seeking possession, alternating between strong and moderate stimuli throughout the match justifying their stay in zone 2, despite left wingers present a greater length of time in this zone. Wingers, in this tactical schema, have the task of attacking the whole time, trying to get the ball out of the opponent and set the move, with little recovery intervals, showed a longer time in zone 3 in relation to other positions.

The study by Gonçalves (2013), with Regular Football players, shows the dwell time for each position from the warming time until the end of the match in 3 intensity zones with HR percentage in relation to HR max. (Pivot zone 1 18.9% zone 2 - 34.6% and zone 3 to 46.4%; Defenders zone 1 - 18.7%, zone 2 - 38.5% and 42.6% and zone 3 Wingers zone 1 - 20.3%, zone 2 - 32.2% and zone 3 to 47.4%). When comparing the Gonçalves (2013) results about the defenders and the Pivots of 5 a side Football in which they had similar tactical functions, we have a difference in zone 1 of 64.3% (18.7% - 83% respectively), in zone 2 at 24.5% (38.5% - 14%, respectively) and in zone 3 42% (42.6% - 0.6%, respectively). These results demonstrate the low intensity during the game of a player in the Pivot function in 5

a side Football, reinforcing the difference of intensity of effort in this position, but contrary to the results found in Gonçalves study (2013), where defenders (fixed) spend most of the time in the zone 3. This difference is repeated in all locations where we can see that despite the 5 Football game be intermittent, if we compare Futsal players' metabolic requirements the latter group is larger.

One limitation of the study was not allowing substitutions during games. Another factor was the lowest fitness team 1, according to the results of the spirometer test, only with substitute players. The lower fitness and lower skill in relation to the starting lineup team, may also have overestimated the HR that consequently meant that we had these results.

In contrast, the average was taken between players of the same position and all the team, balancing these results. As a reminder, this sample is made of 2012 Paralympic Champions players and the Brazilian national team's reserve equals to the top teams of 5 a side Football worldwide. The game was characterized with the starting lineup team by pressing the alternate team often, as with the opponents of the Brazilian national team in this way is a limitation of the study, but at the same time can be used as a parameter for other studies.

The 5 a side Football by having a lower handling to Regular Football and Futsal, keeping much of the time two players defending (Pivot and Volant) and two attacking players (right wing and left wing) splits roughly the time total match between the highest and lowest intensity zones. Visual impairment in this case blindness, assigns the 5 a side Football to have a greater physiological need, evidenced in this study by HR by requiring the senses, auditory and tactile, are more worked during a match, replacing sense visual, raising the percentage of HR and consequently staying most of the time in the higher intensity zones, especially for offensive players who operate in the fight for attack and attack.

CONCLUSIONS

It is concluded that the intensity of effort of the blind athletes of the Brazilian national 5 a side football team is intermittent for remaining 52.5% of the total time of a match of this type (50 minutes) with an intensity of effort between the two zones (between Threshold ventilation and Respiratory Compensation Point) and zone 3 (above the compensation point Respiratory), averaging 89.8% HR max., with intensity effort greater effort than the 11 Football and regular Futsal.

The results of spirometer test (VO2 max.) evidenced an average among 5 a side Football players of 52.8 ml/kg/min^{-1} ± 4.2 getting lower results sighted from Regular Football and Futsal players.
Analyzing the time spent on the intensity zones by position, it can be concluded that the Pivot players had an averaged intensity of HR smaller than the Volants and Wingers, and remaining 85% of the playing time in zone 1, characterized by using the aerobic system. The Volants and the left-wingers players remained more than 50% of the match in zone 2 (aerobic and anaerobic systems). The position that mostly used the anaerobic system (Zone 3) was the Wingers.
Analyzing the time of the team spent on the intensity zones, it was concluded that the greater spent time was on zone 1 (23.9 min.) And the less spent time on zone 3 (6.4 min.). In zone 2, the team remained 19.7 minutes of total playing time.

According to the tactical scheme of the Brazilian 5 a side Football team, system "Y", playing with a Pivot in the front of the goal, one Volant forward the Pivot, helping the defense and the attack and two offensive wingers, the study found that the heart rate of attackers is greater than the defenders, remaining 52.5% of the match in zones 2 and 3. Thus, for training purposes it is important that trainers have this information to differentiate the intensities of stimuli according to each playing position, respecting the tactical displayed.

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