CARDIOPULMONARY RESISTANCE LEVEL (VO^2 MAX.) OF ACADEMIC GRADUATE IN PHYSICAL EDUCATION UNIVERSITY ANHANGUERA UNIDERP - CAMPO GRANDE, MS (BRASIL).

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Introduction

The Exercise Physiology and relatively new to the world of science, because until the late nineteenth century, the physiologists had as main objective, clinical information, giving little attention to the responses of the body during exercise. For a good understanding of our work, it is important to understand that energy metabolism is the set of cell metabolic activities related to energy transformation. This seems to occur because and especially from this information, one can carry out the assessment, prescription and control of physical training, obtaining the prediction "performance" of different types of exercise and identify some mechanisms related to fatigue. (Denadai, 1995)

The big difference between them is the source of your energy. In aerobic exercise during the generation of adenosine triphosphate is the presence of oxygen, anaerobic exercise is already in the absence of oxygen during power generation. Analyzing these two types of exercises we can better understand how energy metabolism during exercise. (McArdle, Katch, and Katch, 1996)

The individual's ability to perform exercises of medium and long term, depends primarily on the aerobic metabolism. Thus one of the highest used to assess this ability, and the maximal oxygen uptake (VO2 max). Although oxygen consumption (VO2) at rest is similar to both trained and untrained individuals during maximal exercise trained individuals have values of VO2, which on average are twice higher than those presented by sedentary individual, thus the VO2 Max ends up being the determining factor of the "performance" of the exercise of long duration. (Denadai, 1995)

However, if the cardiorespiratory endurance which is defined by Robergs and Roberts (2001) as the ability to exchange gases in the lung, and heart and blood vessels circulate blood through the body, this passage is developed is retarded. This resistance is related to cardiac function of the heart, lungs, blood vessels, skeletal muscle and for the exchange of gases and metabolites in blood and skeletal muscle. Therefore the higher the body's ability to perform these functions, the greater the individual's cardiorespiratory endurance.

Individually we can interpret that cardiorespiratory fitness is an important benchmark to determine the physical fitness because it reflects the ability of the individual supporting physical effort for a long period of time. (COSTA et al, 2000)

According to the Second International Consensus Conference Symposium cited by Tritschler (2003), cardiorespiratory fitness is composed of resistance exercise, pulmonary function, heart rate and blood pressure and maximal aerobic power.

The maximal aerobic power is checked by measuring the maximal oxygen uptake (VO2 max), ie, the greatest amount of oxygen absorption, transport and utilization during exercise. Since it is impossible to run an activity at an intensity that demands more oxygen than the body can donate, measurement of VO2 max sets the upper limit of aerobic exercise. (BARROW & McGee, 2003)

How to cardiorespiratory endurance is directly related to VO2 Max is necessary analysis and understanding of what is VO2 Max De Rose cited by Braga and Ferreira (2011), considers it the highest rate of oxygen consumption that is can be reached during maximal or exhaustive exercise. And also according to Martins (2006) Quantity of O2 is that an individual can capture the alveolar air, transport to tissues by the cardiovascular system and use the cellular level in unit time.

Briefly analyzing the VO2 Max proves to be a key measure in exercise physiology, as Morrow et al. (2003), functioning as standard to estimate aerobic capacity. The VO2 max is reached when there is a increase in workload and VO2 remains unchanged or reaches a plateau.

The VO2 Max has been one of the main parameters for classification of physical fitness in children and adults. It is the consistency that exists between the cardiovascular, respiratory and muscle to tackle the demand for energy during exercise. (LAURENTINO & PERENGRINOTI, apud SOUZA, 2008)

The force of any living organism depends on its capacity to consume oxygen environment, its accumulation and mobilization for the functioning of physiological processes second Apanacenko cited by Braga, and Pinheiro Rodrigues (2011), so their health is subject to efficiency this process.

Therefore this paper aims to test, evaluate and analyze the level of cardiorespiratory endurance (VO2 Max) to academic (the)'s Degree in Physical Education from the University Anhanguera UNIDERP - Campo Grande, MS - using the protocol Léger and Lambert (1988)

Materials and Methods

The sample consisted of 39 volunteers, 18 female, mean age 21.1 years (± 2.6) and 21 males, mean age 21.5 years (± 3.0), physically active and healthy. Before starting the test, we applied the PAR-Q questionnaire to assess the risk of coronary heart disease: the Questionnaire for the Physical Activity Readiness (PAR-Q), used to screen for academics to physical exertion and a history , previously validated.

The test was performed at the beginning of April 2012, in the gymnasium of the Institution, during class Exercise Physiology, with Prof. Paulo Braga, as a field activity for understanding the content taught - behavior of VO2 Max

The students were divided into two groups, nominated for group 1 (G1) and group 2 (G2). While academics G1 performed the test G2 wrote down the results after the test, reversed the functions. The academics used the equation VO2 max (ml / kg / min) = (6 XV) - 27.4 - validated by Marcier, Léger and Licking (1982), and the "v" at maximum speed.

The test used was 20 meters - Leger & Lambert (1982) which aims to predict VO2 max in healthy adults and athletes. It boils down to perform a run of back-and-forth with a progressive increase in intensity at every stage in the form of reduced time intervals until volitional exhaustion.

Upon completion of the test the students continued at a pace slightly walk for 5 minutes and lengthened by 10 minutes.

The results of the students were classified as protocol Heyward, (1977) described in Frame 01.

Frame 1 - Classification of VO ² max (ml / kg / min) as Heyward (1977)

Faixa etária	Classificação de VO² Máx. (mL/kg/min)				
	Fraco	Regular	Bom	Muito bom	Excelente
Mulheres					
20-29	≤31	32-34	35-37	38-41	>42
30-39	≤29	30-32	33-35	36-39	>40
40-49	≤27	28-30	31-32	33-36	>37
50-59	≤24	25-27	28-29	30-32	>33
>60	≤23	24-25	26-27	28-31	>32
Homens					
20-29	≤37	38-41	42-44	45-48	>49
30-39	≤35	36-39	40-42	43-47	>48
40-49	≤33	34-37	38-40	41-44	>45
50-59	≤30	31-34	35-37	38-41	>42
>60	≤26	27-30	31-34	35-38	>39

Fonte: (HEYWARD, 1977)

Data analysis was performed using the program Microsoft Excel 2003 and presented the results and rankings individually and calculated the average male and female, as well as their sum and also standard deviation.

Data presentation and discussion

According to the information collected in the test of 20 meters - Leger & Lambert (1982), for determining VO2 Max, the data of individuals were analyzed, first individually and released after and then analyzed collectively.

Table 01 - Variables assessed in the VO^2 Max test of academic (female) n = 18

Mulheres								
Nº	Nome	Idade	Nível	nº percurso	Distância (m)	Vel. Máx. (Km/h)	VO² máx. (ml/Kg/min)	Classificação
1	JPS	20	2	13	260	9	30,0	Fraco
2	FF	20	3	22	440	9,5	33,0	Regular
3	DM	20	3	23	460	9,5	33,0	Regular
4	PP	24	3	23	460	9,5	33,0	Regular
5	NMB	21	3	19	380	9,5	33,0	Regular
6	CPQS	27	3	22	440	9,5	33,0	Regular
7	NCS	20	3	21	420	9,5	33,0	Regular
8	TPF	23	4	25	500	10	36,0	Bom
9	TAP	20	4	30	600	10	36,0	Bom
10	KC	25	4	24	480	10	36,0	Bom
11	PDR	20	4	28	560	10	36,0	Bom
12	BLO	20	4	24	480	10	36,0	Bom
13	DNP	20	4	25	500	10	36,0	Bom
14	AC	24	4	32	640	10	36,0	Bom
15	SRA	23	5	41	820	10,5	39,0	Muito bom
16	AP	20	5	37	740	10,5	39,0	Muito bom
17	JB	21	5	33	660	10,5	39,0	Muito bom
18	BADM	20	9	74	1480	12,5	51,0	Exelente
MÉDIA		21,6	4,0	28,7	573,3	10,0	36,0	Bom
D.V. ±		2,2	1,5	13,1	262,6	0,7	4,5	

As for the variables obtained in the test of VO ² Max got in the group of 18 academics the following averages: 21.6 years (± 2.2) who covered the distance of 573.3 m (± 262.6) to 36 ml / kg / min (± 4.5) VO ² Max and their classification considered GOOD. An academic index showed VO ² Max "Weak", six "Regular", seven "Good," three "very good" and "excellent."

In a survey conducted by Soliane and Castro (2008) on Friday UNIMEP sample of academic test results indicate that cardiopulmonary healthy women, not athletes and volunteers aged between 18 and 28 years, had levels of cardiorespiratory endurance "Good" or "Very good" according to the Guidelines of the Americam Heart Association (2002).

In another survey of female soccer players of elite teams gave average VO2 Max consistent with the average values of this capacity reported by other studies, values ranging from 38.6 ml / kg / min to 57.6 mL / kg / min. (MACIEL, CAPUTO and SILVA, 2011).

In a survey conducted in 2011, with the academic course of Physical Education, University Anhanguera UNIDERP were obtained the following results: the average driving distance was 583.5 m (-213.1 +), with a maximum speed of 10.1 km / h (+ -0.6), the mean VO2 max was 36.4 ml / kg / min. (+ -3.5). Of evaluated, only two were evaluated VO2 max above 40 ml / kg / min. Being the other 16 were lower, ranging from 45 ml / kg / min. Highest and 33 ml / kg / min. the lowest. Thus we conclude that this population VO2 Max is the level sedentary. (BRAGA; PINHEIRO and RODRIGUES, 2011).

Being very similar profiles of the populations evaluated in both surveys, we have a common feature, with data supporting the idea that in general the population is sedentary level and need to improve your cardiorespiratory fitness through aerobic workouts, with mild to moderate intensity and high or medium volume. For when conducted training for cardiorespiratory endurance (walking, jogging, recreational games and sports and circuits) two sessions of 45 min. per week for seven weeks the mean values showed that there is a significant increase in the volume of VO2 Max 39.59 ml / kg / min to 41.55 ml / kg / min, resulting in an increase in the volume of oxygen uptake at 22 adolescents 2nd year of high school. (FACHINETO and Willms, 2011).

Table 02 - Variables assessed in the VO^2 Max test of academics (male) n = 18

Homens								
Nº	Nome	Idade	Nível	nº percurso	Distância (m)	Vel. Máx. (Km/h)	VO^2 máx. (ml/Kg/min)	Classificação
1	JT	27	4	27	540	10	36,0	Fraco
2	DRS	22	5	33	660	10,5	39,0	Regular
3	VCB	23	5	38	760	10,5	39,0	Regular
4	DRS	22	5	41	820	10,5	39,0	Regular
5	PR	23	6	46	920	11	42,0	Bom
6	JPS	20	6	47	940	11	42,0	Bom
7	LRSB	23	6	48	960	11	42,0	Bom
8	AFF	20	6	50	1000	11	42,0	Bom
9	DV	24	7	52	1040	11,5	45,0	Muito bom
10	RA	22	7	56	1120	11,5	45,0	Muito bom
11	LSS	23	7	57	1140	11,5	45,0	Muito bom
12	JOS	27	7	61	1220	11,5	45,0	Muito bom
13	EPF	26	7	61	1220	11,5	45,0	Muito bom
14	GLBN	21	8	62	1240	12	48,0	Muito bom
15	BCF	20	8	65	1300	12	48,0	Muito bom
16	IMA	20	8	65	1300	12	48,0	Muito bom
17	DRU	20	8	71	1420	12	48,0	Muito bom
18	MDJ	20	9	74	1480	12,5	51,0	Excelemte
19	EP	21	9	76	1520	12,5	51,0	Excelemte
20	FH	20	10	89	1780	13	54,0	Excelemte
21	MGSJ	20	11	95	1900	13,5	57,0	Excelemte
MÉDIA		22,1	7,1	57,8	1156,2	11,5	45,3	Muito bom
D.P. ±		2,3	1,8	17,3	345,1	0,9	5,3	

Have you checked the variables in the VO2 Max test of the 21 academic degree in Physical Education from the University Anhanguera UNIDERP the averages were as follows: 22.1 years (± 2.3) of age, distance traveled was 1156.2 m (± 345 , 1) and VO ² max of 45.3 ml / kg / min (± 5.3), corresponding to the level of classification "Very good." Being an individual was classified as "weak", three "Regular", four presented a classification defined as "Good", nine classified as "Very Good" and four students were classified as "Excellent".

According to the research of Lima, Silva e Souza (2005) test was applied VO ² Max on 13 soccer players with a mean age of 18.6 years (± 1.9), was used field test of 3,200 m , and the mean of the VO ² max value of 58.5 ml / kg / min. (± 8.5). As these authors citing Souza (2005) who studied soccer players in the field of 17 to 20 years and averaged 62.8 ml / kg / min (± 10.1) of VO ² Max

Jones and Helmes cited by Lima, Silva e Souza (2005) also studied athletes, footballers field aged 14 to 18 with a mean VO ² Max 55.1 to 61.1 ml / kg / min.

According Luchesi (2003) VO2 Max, as an indicator of aerobic capacity of an individual, is, however, limited ability to adapt to chronic stimuli of exercise, and as Weineck quoted by the same author, in addition to their trainability (biological sensitivity training stimuli) to be significantly dependent hereditary aspects.

Considerations

From the data presented, the results provide an objective classification of cardiorespiratory endurance, and can be considered that practical classes favored the test performance of 20 meters - Leger & Lambert (1982) applied to students of Bachelor in Physical Education they are (as) individuals active and healthy, justifies the reason why most academics (as) has a rating of VO ² Max between regular and very good.

This research is not intended to be definitive, it is necessary to expand the quantitative evaluated, as well as evaluate other classes of Physical Education course in order to verify if there is a standard result of VO2 Max in this population.

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