16 - ASSOCIATION CARDIORESPIRATORY FITNESS AND HYPERTENSION IN ADOLESCENTS

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INTRODUCTION

The non-transmissible chronic diseases, according to World Health Organization (WHO), are currently the leading cause of mortality in the world (Manton, 1998). In Brazil, the diseases of the circulatory system are know as the leading cause of death (Chor et al., 1995).

Hypertension is a major modifiable risk factor for coronary disease, cerebrovascular disease and congestive heart failure, and other cardiovascular diseases (National High Blood Pressure-NHBP, 1994) Thus, the knowledge of distribution of hypertension in the population and identification of vulnerable groups are of great interest to public health.

The development of cardiorespiratory fitness shows beneficial effects in prevention and treatment of various risk factors such as hypertension in individuals of all ages, even those with increased risk of developing it (Paffenbarger et al., 1983; BOREHAM et al ., 1990; WAREMAN et al., 2000).

However these inverse relationships between the increased cardiorespiratory fitness with decreasing blood pressure in children and adolescents have shown conflicting results (MANSON et al., 1992).

Bearing in mind these aspects, this study aimed to establish associations of cardiorespiratory fitness, on the levels of blood pressure (BP) in a regional sample of adolescents of both sexes.

METHODS

Subjects

The sample of adolescents from both sexes (208 boys and 324 girls)., Aged between 9 and 19 years enrolled in public education in the city of Curitiba, in Parana, in academic year 2007 and 2008. A a consent form was signed by parents or guardians after clarification of the goals and methods of research.

Instruments and procedures

All evaluations were carried out on their own schools. The measurements were performed by a trained staff of the laboratory's Research Center for Exercise and Sport (CEPE) of the Department of Physical Education Sector of Biological Sciences, Federal University of Parana (UFPR).

Anthropometric measures

Body weight and height were measured to calculate. The total height (measure corresponding to the distance between the plant and vertex region) was evaluated using a portable vertical stadiometer Brand WCS, staggered by 0.1 cm, positioned at the Frankfurt. To determine body mass, we used a portable digital scale, brand Plenna with resolution of 100, with the individual barefoot and wearing only light costumes.

Cardiorespiratory fitness

To predict the VO2max, we used the test will come from 20-m, proposed by Léger et al. (1988). This indirect test is to travel a distance of 20 meters demarcated following a rhythm sound that determines the speed of race. The speed increases by 0.5 km / h every minute, with the initial velocity test of 8.5 km / h. The test is terminated when the individual is no longer able to follow the rhythm sound proposed. It applies a mathematical formula that takes into account the age (I) and the running speed (V) in which the test was stopped for estimation of VO2max (VO2max = 31,025 + 3,238 * -3248 V + 0.1536 * I * V * I).

The subjects were divided into categories for values of cardiorespiratory fitness (mL.kg-1.min-1) as the classification proposed by Rodrigues et al. (2006). But for this study used three categories: Category 3, very weak and low (boys <girls and 43.3 <36.4), Category 2, regular and good (boys <girls and 52.2 <42.4), Category 1, excellent (boys and girls = 52.2 = 42.4).

Blood pressure (BP)

The PA was measured by auscultatory method, following the parameters established by The Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents. Systolic blood pressure (SBP) and diastolic (DBP) were measured in the right arm of assessed, using a column of mercury sphygmomanometer posted at the heart and a stethoscope located above the brachial artery. The PAS was defined as the sound of Korotkoff phase 1 and DBP as the sound of Korotkoff phase 4 or 5, where the sounds were coming from zero. The measurement was made after the individual to remain seated at rest for a period of ten minutes. Cuffs were used in accordance with the appropriate arm of the estimated size (minimum 40% of the circumference of the arm at the midpoint between the acromion and olecrânio). Two readings were taken with an interval of ten minutes between measurements, using the value between the two measurements as average. If the difference between the two measures were greater than 4 mmHg, a third measure was carried out after ten minutes. It was used as a cutoff point for hypertension values of SBP or DBP = 95 percentile according to sex, age and percentile of height.

Data processing and statistics

The associations of cardiorespiratory fitness, with blood pressure were done through analysis of binary logistic regression. Data were expressed as mean and standard deviation to characterize the sample. The tests were performed in statistical software SPSS 13.0 (Chicago, IL), with significance level set at $p < 0.05$ for all analysis.

RESULTS

The descriptive data of decimal age, height, body weight, systolic and diastolic blood pressure, $VO2_{máx.}$ relative and absolute for both sexes are presented in Table1.

Table 1. Values of average, standard deviation, minimum and maximum of variables

	Male N = 208	Female N = 324
age	14,88±1,8 (9,39 – 18,42)	14,81±1,85 (10,20 – 19,85)
BMI (Kg/m^2)	20,50±3,44 (13,8 – 33,59)	21,03±3,76 (13,41 – 38,28)
PAS (mmhg)	103,19±14,65 (72 – 160)	98,55±13,13 (60 – 140)
PAD (mmhg)	69,58±11,45 (46 – 94)	67,54±10,66 (40 – 98)
Height (cm)	166,31±11,22 (13,42 – 18,85)	158,72±7,37 (126,66 – 181,5)
Weight(Kg)	57,01±12,56 (29,70 – 105,40)	53,24±11,15 (27,70 – 90,50)
$VO_{2\ máx.}$absoluto	2,57±0,61(1,13 – 4,18)	2,05±0,43(1,03 – 3,68)
$VO_{2\ máx.}$relativo	45,52±6,54 (27,62 – 59,35)	38,9 ±5,03 (20,20 – 52,49)

Table 2. Classification of physical fitness

	BOYS		GIRLS	
	OR	IC	OR	IC
1. HIGH FITNESS	1	1	1	1
2. NORMAL	1,39	(0,63-3,04)	1,39	(0,66-2,93)
3. LOW FITNESS	1,66	(0,78-3,15)	1,27	(0,64-2,56)

DISCUSSION

This study aimed to examine the association between cardiorespiratory fitness in adolescents with hypertension. In this sense, our results showed that there is not a significant relationship between VO2max with hypertension for both sexes. Other studies have shown that the relationship between higher cardiorespiratory fitness and lower cardiovascular risk profile has been demonstrated in children and adolescents of both sexes (SHEA et al., 1994; Al-Haza et al., 2002; STABELINI NETO et al. , 2008). Even in children and young people(5 years), there has been this association, by observing that the expected increase in blood pressure with advancing age was mitigated those who had better physical fitness (SHEA et al, 1994). However, there are contradictory results that can be attributed to methodological differences in the identification and classification of cardiorespiratory fitness and body fat composition of the sample (GUTIN et.al, 1990, WAR et al, 2002) and the genetic differences and levels of maturity and growth (Thomas et al., 2003).

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ABSTRACT

Aim: To establish associations between cardiorespiratory fitness (VO_{2max}), with hypertension in adolescents. Method: The sample of 324 girls and 208 boys, aged 9 throw 19 years. Body weight and height were measured. O VO_{2max} was estimated at 20 m test proposed by Léger. Blood pressure (BP) was measured using a sphygmomanometer the column of mercury. It was considered hypertension percentile 95°. Statistical analysis was usedbinary logistic regression, with p< 0.05. Results: There wasn't significant association between cardiorespiratory fitness ($VO_{2\ max}$) and blood pressure in our study. Conclusion: Cardiorrespiratory fitness and hypertension show little conclusive relationship.

Key words: hypertension, cardiorespiratory fitness, teenagers.

RÉSUMÉ

Objectif: créer des associations entre cardio-fitness ($VO2_{máx.}$), à l'hypertension chez les adolescents. Méthode: L'échantillon de 324 filles et 208 garçons, âgés de 9 jeter de 19 ans. De poids corporel et la taille ont été mesurés. O $VO2_{máx}$ a été estimée à 20 m d'essai proposée par Léger. La tension artérielle (BP) a été mesurée au moyen d'un sphygmomanomètre la colonne de mercure. Il a été considéré comme l'hypertension percentile 95o. Statistical a été utilisé la régression logistique binaire, avec panalysis <0,05. Résultats: Il n'y avait pas d'association significative entre cardio-fitness ($VO2_{máx}$) et la pression sanguine dans notre étude. Conclusion: Cardiorrespiratory de remise en forme et l'hypertension sont peu concluants relation.

Mots clés: hypertension, cardio-fitness, des adolescents.

RESUMEN

Objetivo: Establecer asociaciones entre la aptitud cardiorrespiratoria ($VO2_{máx}$), con la hipertensión en los adolescentes. Método: La muestra de 324 niñas y 208 niños, de 9 años de edad tirar 19 años. De peso corporal y la altura fueron medidos. O $VO2_{máx}$ se estimó en 20 m de prueba propuestos por Léger. Presión arterial (PA) se midió utilizando un esfigmomanómetro la columna de mercurio. Se consideró hipertensión percentil regresión logística binaria, con p95°. El análisis estadístico se utilizó <0,05. Resultados: No hubo asociación significativa entre la aptitud cardiorrespiratoria ($VO2_{máx.}$) y la presión arterial en nuestro estudio. Conclusión: la aptitud cardiorrespiratoria y la hipertensión muestran poco concluyentes relación.

Palabras clave: hipertensión arterial, la aptitud cardiorrespiratoria, los adolescentes.

RESUMO

Objetivo: Estabelecer associações entre aptidão cardiorrespiratória (VO2max), com a hipertensão arterial em adolescentes. Método: A amostra foi composta por 324 meninas e 208 meninos, com idades entre 9 a 19 anos. Massa corporal e estatura foram mensuradas.O VO2max foi estimado pelo teste de 20 m proposto por Léger. A pressão arterial (PA) foi mensurada utilizando-se um esfigmomanômetro de coluna de mercúrio. Considerou-se hipertensão PA sistólica ou diastólica e percentil 95º. Para análise estatística, foi utilizada regressão logística binária, com p<0,05. Resultados: Não foi significativa a associação entre aptidão cardiorrespiratória ($\underline{VO_{2máx.}}$) e pressão arterial em nosso estudo. Conclusão: Aptidão cardiorrespiratória e hipertensão arterial apresentou relação pouco conclusiva.

Palavras-chave: hipertensão arterial, aptidão cardiorrespiratória , adolescentes.