204 - ANALYSES OF ANTHROPOMETRICS, ADIPOSITY AND PHYSICAL FITNESS INDEXES BETWEEN SEXES IN THE AGE OF 11 YEARS OLD

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INTRODUCTION

Adiposity anthropometric indexes (how fat percentage and body mass index) had been used in childhood and adolescents studies mainly when the objective is to detect obesity and overweight (LOHMAN, 1992).

Cardiorespiratory and neuromuscular fitness are fundamental components of health physical fitness and they are important for health and well-being of children (TRITSCHLER, 2003). Better levels of physical fitness are associated with lower risks of death by cardiovascular disease, lower incidence of non-insulin dependent mellitus diabetes and obesity.

Strength difference between boys and girls in childhood is consistent and small and with the age development the percentage of girls that meet the same strength level of boys is reduced, mainly after sixteen years of age. The relative medium difference of VO_2 max between sexes before ten to twelve years of age is about 5 to 10% and the level is higher in boys. Girls are more flexible than boys in all ages and difference between sexes is higher in the adolescent spurt growth and in maturational sexual process (MALINA and BOUCHARD, 1991).

Due to chronological age, it has been used in monitoration and accompaniment studies of child and adolescent physical fitness (MALINA and BOUCHARD, 1991), and by validated indirect instruments to sexual maturation self-assessment; it had been developed for people aged between 12 and 16 years of age (MORRIS and UDRY, 1980); the objective of this study is to examine the same chronological range and between sexes, the differences between anthropometric, adiposity and physical activity indexes.

METHODS

Population and sample

The sample was composed of 28 boys and 42 girls in the age of 11 years old and they were enrolled in a public school of Araucaria-PR.

Procedures

Body mass and body height were collected with procedures cited by GORDON, CHUMLEA and ROCHE (1991) and the instrument used was balance (100 g) and stadiometer (cm), respectively. Skinfolds were collected with procedures suggested by HARRISON, BUSKIRK, CARTER, JOHNSTON, LOHMAN, POLLOCK, ROCHE and WILMORE (1988), caliper (1/10 mm). Blood pressure was collected with procedures cited by ACSM (2003).

Fat percentage was calculated by the equation of BOILEAU et al. (1985) that used triceps (TR) and subscapular (SE) skinfolds, mm. Equation for males was fat percentage = $(1.35 \times (TR+SE)) - (0.012 \times (TR+SE)^2) - 4.4$.

Sit-and-reach test and hand grip test were performed according to JOHNSON and NELSON (1986) and SAFRIT (1986) and the instruments used were appropriated box with scale of 0,5 cm and with 23 cm at the level of plantar feet and grip dynamometer. VO_2 max was estimated using 20-m Shuttle Run test developed by LÉGER, MERCIER, GADOURY and LAMBERT (1988) and appropriated sound equipment was used.

The people that met the following values for physical fitness variables were considered as people that reached good levels of health physical fitness: fat percentage lower than 25% for boys and 30 % for girls (WILLIAMS, GOING, LOHMAN, HARSHA, SRINIVASAN, WEBER and BERENSON, 1992); grip strength of the right hand in same value or higher than 18.8 and 16.5 and of the left hand in same value or higher than 17.7 and 15.5 (JOHNSON and NELSON, 1986); VO_2 max in same value or higher than 42 and 38 ml?Kg^{-1}?min^{-1} (HOWLEY and FRANKS, 1997), respectively boys and girls; and for sexes flexibility levels in same value or higher than 25.0 cm (AAHPERD, 1988).

Data treatment

For the statistic treatment descriptive statistic was used; *t* independent test of Student, ($p<0.05$). The variables analyzed were age, body mass, body height, BMI, fat percentage, lean body mass, flexibility, grip strength of right and left hands and VO_2 max. Chi-Square test was used to analyze between sexes the relative value of people that met advisable indexes for health physical fitness, ($p< 0.05$).

RESULTS

Body mass, body height, BMI, resting systolic blood pressure, flexibility and grip strength by left and right hands were discreetly more elevated for girls and for boys than the variables of lean body mass and resting diastolic blood pressure. Table 1 and 2.

Fat percentage and VO_2 max were statistically differentiated between sexes (Table 1 and 2). VO_2 max was higher for boys and fat percentage for girls.

Table 1. Anthropometric, adiposity and body composition variables between sexes aged in 11 years old

Variables	Boys	Girls
Body mass (Kg)	36.6 ± 8.1	38.1 ± 9.7
Body height (cm)	142.0 ± 6.7	144.2 ± 7.4
BMI (Kg/m^2)	18.0 ± 3.2	18.1 ± 3.5
Fat percentage *	19.0 ± 7.4	23.5 ± 7.0
Lean body mass (Kg)	29.2 ± 4.3	28.7 ± 5.6

* different between boys and girls ($p<0.05$)

Table 2. Cardiorespiratory and neumomuscular fitness variables between sexes aged 11 years old

Variables	Boys	Girls
Resting systolic BP (mmHg)	89.4 ± 12.8	94.6 ± 15.7
Resting diastolic BP (mmHg)	56.0 ± 11.8	54.3 ± 10.6
VO_2 max (ml?Kg^{-1}?min^{-1}) *	47.4 ± 3.8	45.1 ± 3.0
Flexibility (cm)	27.0 ± 5.5	27.2 ± 6.4
Grip strength of the right hand (Kgf)	21.3 ± 3.1	21.6 ± 4.5
Grip strength of the left hand (Kgf)	20.2 ± 3.1	20.5 ± 4.0

* different between boys and girls ($p<0.05$)

There was higher relative value of girls with better indexes of grip strength of the right and left hands than boys (Table 3). Fat percentage lower than risk values for the development of coronary cardiac disease, flexibility levels in the same value or higher than the reference of AAHPERD (1988) and VO_2 max in same value or higher than the reference of HOWLEY and FRANKS (1997) were homogeneous between sexes.

Table 3. Relative values between sexes in people that meted criterions for health physical fitness

Variables	Boys	Girls
Fat percentage lower than risk values for the development of coronary cardiac disease (WILLIAMS et al., 1992)	75.0 %	78.6 %
Flexibility levels in same value or higher than the reference of AAHPERD (1988)	64.3 %	69.0 %
Grip strength of the right hand in same value or higher than the reference of JOHSON and NELSON (1986) *	60.7 %	76.2 %
Grip strength of the left hand in same value or higher than the reference of JOHSON and NELSON (1986) *	67.9 %	85.7 %
VO_2 max in same value or higher than the reference of HOWLEY and FRANKS (1997)	85.7 %	90.5 %

* different between boys and girls ($p<0.05$)

DISCUSSION

The girls had greater values of fat percentage than the boys and the boys had higher values of lean body mass than the girls and the results agreed with data of (WANG, 2002).

The higher body height for girls aged 11 years old in this study is in agreement with studies of BERGMANN, ARAÚJO, GARLIPP, LORENZI and GAYA (2005) and what it is not in conformity with is the fact that in this study girls have presented higher values for the body mass and BMI than that of the boys.

The small difference found between sexes for the result of grip strength of left and right hands is in agreement with studies of GAYA, CARDOSO, SIQUEIRA and TORRES (1997), therefore, it tells that the strength difference is small in the age of 11 years. However, what it is in disagreement with is the fact that in this study girls have presented discreetly, higher level of grip strength than that of boys and in the study of GAYA et al. (1991) boys have presented higher level of strength than the girls.

The fact that girls are more flexible than boys in all ages (MALINA and BOUCHARD, 1991) is present in the results of this study. VO_2 max of the boys is higher than the girls´ and this result is in compliance with studies of Malina and Bouchard (1991). The VO_2 max of a girl corresponds to 95.1 % of the VO_2 max of boys, or it is higher than the reference of 85 to 90% suggested by these authors.

Due to the existence of higher percentage of girls who reach advisable minimum criteria of related health physical fitness it is possible to affirm that the girls have better levels of VO_2 max, strength, flexibility and fat percentage than the boys. In BERGMANN et al. (2005) studies it was possible to observe the opposite, or that the boys in the age of 11 years had presented better cardiorespiratory and neuromuscular fitness indexes (force and flexibility) than that of the girls. The fact that there was higher percentage of girls who are inside the healthful parameters of accumulation of fat percentage than that of the boys was similar between the studies.

CONCLUSION

Indexes of adiposity (fat percentage), cardiorespiratory fitness (VO_2 max) and relative value of people that met criterions for health physical fitness (grip strength of the right and left hands of boys) were not homogeneous.

Body mass, body height, resting blood pressure, BMI, flexibility and grip strength of left and right hands were similar between sexes.

The percentage of girls who had reached advisable criteria for the health in relation to the maximum consumption of oxygen, strength, flexibility and accumulation of fat percentage were higher than the percentage found for the boys.

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ANALYSES OF ANTHROPOMETRICS, ADIPOSITY AND PHYSICAL FITNESS INDEXES BETWEEN SEXES IN THE AGE OF 11 YEARS OLD

ABSTRACT

OBJECTIVE: to examine the differences between the anthropometrics, adiposity and physical fitness indexes between boys and girls in the same chronological age. **METHODS**: the sample was composed by 28 boys and 42 girls in the age of 11 years and enrolled in a public school of Araucaria-PR. Fat percentage was calculated by the equation of BOILEAU et al. (1985), sit-and-reach test and hand grip test were performed according to JOHNSON and NELSON (1986) and SAFRIT (1986) and VO_2 max was estimated using 20-m Shuttle Run test developed by LÉGER et al. (1986). Resting blood pressure (BP) was collected by the procedures suggested by ACSM (2003). Descriptive statistic and independent *t* test of Student were used to examine the differences of the variables studied between sexes, ($p<0.05$). **RESULTS**: there were significant differences found ($p<0.05$) for the fat percentage (19.0±7.4 and 23.5±7.0 %, respectively, boys and girls) and for the VO_2 max (47.4±3.8 and 45.1±3.0 ml?Kg^{-1}?min^{-1}) between the studied sexes. There were not significant differences found between sexes for the variables body mass (36.6±8.1 and 38.1±9.7 Kg, boys and girls), body height (142.0±6.7 and 144.2±7.4 cm), resting systolic BP (89.4±12.8 and 94.6±15.7 mmHg) and diastolic BP (56.0±11.8 and 54.3±10.6 mmHg), BMI (18.0±3.2 and 18.1±3.5 Kg/m^2), lean body mass (29.2±4.3 and 28.7±5.6 Kg), sit-and-reach test (27.0±5.5 and 27.2±6.4 cm), grip dynamometry of right hand (21.3±3.1 and 21.6±4.5 Kgf) and left hand (20.2±3.1 and 20.5±4.0 Kgf). **CONCLUSION**: They were not homogeneous between boys and girls as indicator of adiposity (fat percentage) and of cardiorespiratory fitness (VO_2 max). The variable body mass, body height, resting blood pressure, BMI, flexibility and grip strength of right and left hands were similar between boys and girls.

Key-words: adiposity, physical fitness and sexes.

ANALYSE DES INDICATEURS ANTHROPOMÉTRIQUES, D´ADIPOSITÉ ET D´APTITUDE PHYSIQUE ENTRE DES GARÇONS ET DES FILLES DANS L´ÂGE DE 11 ANNÉES

RÉSUMÉ

OBJECTIF: examiner les différences entre les indicateurs anthropométriques, d´adiposité et d´aptitude physique entre des garçons et des filles dans le même âge chronologique. **MÉTHODES:** l´échantillon a été composé par 28 garçons et 42 filles dans la bande étaire de 11 années et inscrits dans une École de Filet Public d´Enseignement. Le pourcentage de graisse a été calculé par l´équation de BOILEAU et al. (1985), les essais de s´asseoir et atteindre et l´essai de dinamometrie manuel ont été réalisés par les conduites suggérés pour JOHNSON et NELSON (1986) et l´essai développé pour LÉGER et al. (1988) a été utilisé pour la conjecture du VO_2 max. La pression artérielle de repos a été collecté par les conduites de ACSM (2003). Ont été utilisés la statitisque descriptive et l´essai *t* indépendant de Student avec l´objectif d´examiner les différences des variables étudiées entre des sexes en étant $p<0,05$. **RÉSULTATS:** ont été trouvées des différences significatives ($p<0,05$) pour la variable de pourcentage de graisse (19,0±7,4 et 23,5±7,0 %, respectivement garçons et filles) et pour le VO_2 max (47,4±3,8 et 45,1±3,0 ml?Kg^{-1}?min^{-1}) entre les sexes étudiés. N´ont pas été trouvées des différences significatives entre des sexes pour le variable masse corporelle (36,6±8,1 et 38,1±9,7 Kg, garçons et filles), la stature (142,0±6,7 et 144,2±7,4 cm), PA systolique (89,4±12,8 et 94,6±15,7 mmHg) et diastolique de repos (56,0±11,8 et 54,3±10,6 mmHg), l´IMC (18,0±3,2 et18,1±3,5 Kg/m^2), masse corporelle maigre (29,2±4,3 et 28,7±5,6 Kg), l´essai de sásseoir et atteindre (27,0±5,5 et 27,2±6,4 cm), dinamometrie manuel par l´hemicorps droit (21,3±3,1 et 21,6±4,5 Kgf) et gauche (20,2±3,1 et 20,5±4,0 Kgf). **CONCLUSION:** l´indicateur d´adiposité corporelle (graisse corporelle relative) et d´aptitude physique (VO_2 max) n´ont pas été homogènes entre des garçons et des filles. Les variables masse corporelle, stature, pression artérielle de repos, IMC, flexibilité et force de tenue manuel par l´hemicorps droit et gauche ont été semblables entre des garçons et des filles.

Mots-clés: adiposité, aptitude physique, garçons et des filles

ANÁLISIS DE LOS INDICADORES ANTROPOMETRICOS, DE LA ADIPOSIDAD Y DE LA APTITUD FÍSICA ENTRE LOS MUCHACHOS Y LAS MUCHACHAS EN LA EDAD DE 11 AÑOS

RESUMEN

OBJETIVO: para examinar las diferencias entre los indicadores de los antropométricos, del adiposo corporal y de la aptitud física entre los muchachos y las muchachas en la misma edad cronológica. MÉTODOS: La muestra fue compuesta para 28 muchachos y 42 muchachas en la edad de 11 años y matriculados en una escuela de la red pública de la educación. El porcentaje de la grasa era calculado por el BOILEAU et al. (1985), las pruebas de asentar y alcanzar y del dinamometria manual fueron llevadas a través de los procedimientos sugeridos para JOHNSON y NELSON (1986) y la prueba desarrollada por

LÉGER et al. (1988) fue utilizado para la estimativa del VO2 max. La presión arterial de reposo fue recogida por los procedimientos sugeridos para el ACSM (2003). Fueron utilizadas la estadística descriptiva y el examen *t* independiente de Student con el objetivo de examinar las diferencias de las variables estudiadas entre sexos, siendo p<0,05. RESULTADOS: Fueron encontradas diferencias significativas (p<0,05) para la variable porcentaje de grasa (19,0±7,4 y 23,5± 7.0%, respectivamente muchachos y muchachas) y para el VO2 max (47,4±3,8 y 45,1±3,0 ml?Kg-1?min-1) entre los sexos estudiados.No fueron encontradas diferencias significativas entre las variables masa corporal (36,6±8,1 y 38,1±9,7 Kg, muchachos y muchachas), estatura (142,0±6,7 y 144,2±7,4 cm), PA sistólica (89,4±12,8 y 94,6±15,7 mmHg) y diastólica de reposo (56,0±11,8 y 54,3±10,6 mmHg), IMC (18,0±3,2 y 18,1±3,5 Kg/m2), masa corporal magra (29,2±4,3 y 28,7±5,6 Kg), examen de sentar y alcanzar (27,0±5,5 y 27,2±6,4 cm), dinamometria manual por el hemicorpo derecho (21,3±3,1 y 21,6±4,5 Kgf) y izquierdo (20,2±3,1 y 20,5±4,0 Kgf).**CONCLUSIÓN:** No habían sido homogéneos entre los muchachos y las muchachas el indicador del adiposo corporal (grasa corporal relativa) y de la aptitud física (máximo VO2). Las masas corporales variables, estatura, presión arterial de reposo, IMC, la flexibilidad y la fuerza del asimiento manual para el hemicorpo derecho e izquierdo fueron similares entre los muchachos y muchachas.

Palabras-llaves: adiposidad, aptitud fisica, muchachos y muchachas

ANÁLISE DOS INDICADORES ANTROPOMÉTRICOS, DE ADIPOSIDADE E DE APTIDÃO FÍSICA ENTRE MENINOS E MENINAS NA IDADE DE 11 ANOS

RESUMO

OBJETIVO: examinar as diferenças entre os indicadores antropométricos, de adiposidade corporal e de aptidão física entre meninos e meninas na mesma idade cronológica. **MÉTODOS**: A amostra foi composta por 28 meninos e 42 meninas na faixa etária de 11 anos e matriculados em uma Escola da Rede Pública de Ensino. O percentual de gordura foi calculado pela equação de BOILEAU et al. (1985), os testes de sentar e alcançar e o de dinamometria manual foram realizados pelos procedimentos sugeridos por JOHNSON e NELSON (1986) e SAFRIT (1986) e o teste desenvolvido por LÉGER et al. (1988) foi utilizado para a estimativa do VO_2 max. A pressão arterial de repouso foi coletada pelos procedimentos sugeridos pelo ACSM (2003). Foram utilizadas a estatística descritiva e o teste *t* independente de Student com o objetivo de examinar as diferenças das variáveis estudadas entre sexos, sendo p<0,05. **RESULTADOS**: Foram encontradas diferenças significativas (p<0,05) para a variável percentual de gordura (19,0±7,4 e 23,5±7,0 %, respectivamente meninos e meninas) e para o VO_2 max (47,4±3,8 e 45,1±3,0 ml?Kg^{-1}?min^{-1}) entre os sexos estudados. Não foram encontradas diferenças significativas entre sexos para as variáveis massa corporal (36,6±8,1 e 38,1±9,7 Kg, meninos e meninas), estatura (142,0±6,7 e 144,2±7,4 cm), PA sistólica (89,4±12,8 e 94,6±15,7 mmHg) e diastólica de repouso (56,0±11,8 e 54,3±10,6 mmHg), IMC (18,0±3,2 e 18,1±3,5 Kg/m^2), massa corporal magra (29,2±4,3 e 28,7±5,6 Kg), teste de sentar e alcançar (27,0±5,5 e 27,2±6,4 cm), dinamometria manual pelo hemicorpo direito (21,3±3,1 e 21,6±4,5 Kgf) e esquerdo (20,2±3,1 e 20,5±4,0 Kgf). **CONCLUSÃO**: Não foram homogêneos entre meninos e meninas o indicador de adiposidade corporal (gordura corporal relativa) e o de aptidão física (VO_2 max). As variáveis massa corporal, estatura, pressão arterial de repouso, IMC, flexibilidade e força de preensão manual pelo hemicorpo direito e esquerdo foram semelhantes entre meninos e meninas.

Palavras-chaves: adiposidade, aptidão física e sexos.