74 - BODY COMPOSITION AND PHYSICAL FITNESS OF ADOLESCENTS OF DIFFERENT SOCIAL AND ECONOMICAL LEVEL

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INTRODUCTION

The development of human is composed by many phases, since the conception until the maturity and the old age. During the process of growing and biological development, occurs a serie of changes in physical constituion that are expressed by the modifications in dimensions, structure and body composition. Alterations in alimentary habits associateds to a higher tendency to sedentarism has been observed in last decades, being directly related with a higher prevalence of obesity in children and adolescents. The obesity is considered a serious public health problem of worldwide order. A preventive function that the physical education programs offer to the children at school is very important for the adult life of these individuals, already obstruct, soften or put off the appereance of certain illness as the obesity, the hipertension, the diabettes, heart illness or cancer, case the habit of practice come to be incorporated in their life.

The accompanying of alterations of body composition and the alimentary habits and of the motor development of the individuals since the infancy permit the precocious diagnostic of changed standard that obstruct the healthy development allowing that preventive actions can be taken.

The present study aim to analyze the body composition and the physical fitness of adolescents, considering the biological maturation and the social and economical level.

MATERIALS AND METHODS

Sample: Participated of these study 76 adolescents. The social and economical levels were determinated according to their school: public school (n=38; 13.14 1.57 years) and private (n=38; 12.24 1.42 years). For the analysis, the adolescents were separated by the presence of the menarche (matured) and absence of menarche (non matured). A total of 23 students of public schools (13. 79 1.47years) and 23 (12.65 1.40 years) of private schools had already presented menarche. The other adolescents, 15 (12.06 1.24 years) of public school and 15 (11.60 1.24 years) of private school until hadn`t present menarche. Only the adolescents that their parents signed the term of consent freedom and evident participated of study.

Body composition: The body composition was estimated by the anthropometric method indicated by ISAK (*International Society for Advancement in Kinanthropometry*). Were obtained skinfolds thickness (CESCORF, 0.1 mm), body perimeters (flexible metalic tape, 1cm), bone diameters (anthropometer, 1mm), height (stadiometer, 1cm) and total body mass (TBM, eletronic balance SHOENLE, 50g). These measurements permitted estimate the parameters: relative body mass (%, Slaughter, 1998), fat mass (FM, from %), residual mass (RM), bone mass (BM) from model of Von Döbeln modified by Rocha (1995), and muscle mass (MM) obtained by the equation [MM = TBM - (FM+BM+RM)]. The body mass index (BMI = TBM/height^2, kg.m^2) was analized by the classification of World Health Organization (WHO). The somatotype was obtained by the anthropometric method of Heath Carter (Carter & Ross, 1983).

Physical fitness testing: The following tests were applied: flamingo balance (total body balance), tapping test of arms (velocity of arms), sit and reach (reach), standing broad jump (explosive force), hand grip test (force), abdominal test (trunk muscle force), bent arm hang (force), velocity shuttle run (velocity and agility) and endurance shuttle run (cardiorespiratory endurance), according to *Comittee for the development of sport of the council of Europe* (Eurofit, cited by Marins & Giannichi, 1996).

Biological development: The period of biological development was estimated from the protocol of Tunner (1988), where it was observed the development of breasts and the pubic hair. The menarche presence was declared as well as its age. The protocol of Tunner was applied in private interview, where the researcher registered the auto-evaluation of the adolescents, after to have informed them of the aim of the study.

Statistics Analysis: For the statistics analysis was realized the Excel (2003) adopting the t-Student test non pareated for the comparisons between groups (p = 0.05).

RESULTS:

Sample caracterization: In table 1 are the results of the characterization of the sample of matured and non matured adolescents. The age presented greater values for the adolescents of the public school.

TABLE 1
SAMPLE CHARACTERISTICS

Variables	Age (years)	Total Body Mass (kg)	Height (m)	BMI (kg.m^2) Classification (WHO)	Heath Carter Somatotype
Matured					
Public School	13.79 ±1.47	48.58 ±9.47	1.56 ±0.07	19.92 ±2.79 (Normal)	Endomorph-mesomorph 3.70 - 3.84 - 3.17
Private School	12.65 ±1.40	50.94 ±9.05	1.57 ±0.06	20.52 ±3.23 (Normal)	Endomorph-mesomorph 4.96-4.18-2.94
p	0.001	0.387	0.349	0.50	-
Non matured					
Public School	12.06 ±1.24	44.36 ±9.90	1.52 ±0.08	19.07 ±3.11 (Normal)	Endomorph-mesomorph 4.65 - 4.42 - 3.20
Private School	11.60 ±1.24	42.22 ±8.76	1.49 ±0.08	18.85 ±3.31 (Normal)	Endomorph-mesomorph 4.60 - 4.08 - 3.12
p	0.308	0.531	0.377	0.852	

Biological development: No significantly differences were found to breasts development between the matured adolescents of public school (4.04 ± 0.64) and private (3.78 ± 0.67). For the pubic hair, the same result was obtained (private school =3.00 ±0.95 and public school=2.70 ±1.1 with p=0.323). The absence of significantly differences was maintained in non matured adolescents analysis: breasts development (public school=2.60 ± 1.24; private school=2.33 ±1.05); pubic hair development (private school =2.13 ±0.9; public school =1.93 ±1.03,) with p=0.592.

Skinfolds thickness: Only in the region of the biceps a bigger accumulation of fat in the group of matured adolescents of the private school was found. The comparison of the matured adolescents did not present significantly differences for distribution of the body fat (Table 2). In the comparison of the body mass we find, only, significantly differences for bone mass (Table 3).

TABLE 2
SKINFOLDS THICKNESS OF MATURED AND NON MATURED ADOLESCENTS OF DIFFERENT SOCIAL AND ECONOMICAL LEVELS

Skinfolds thickness	Triceps	Mid axilary	Subscapular	Supra iliac	Pectoral	Abdomen	Biceps	Mid-Thigh	Calf
Matured									
Public School	14.22 +4.93	8.27 +3.59	10.91 +4.21	18.03 +9.30	7.99 +5.29	20.15 +8.58	6.40 +2.44	23.53 +7.87	15.03 +6.04
Private School	14.62 +4.00	10.16 +4.16	11.37 +4.34	20.67 +7.41	7.97 +2.89	21.66 +7.39	8.49 +2.73	27.11 +8.08	15.60 +3.43
P	0.762	0.103	0.713	0.288	0.986	0.522	**0.008**	0.130	0.692
Non Matured									
Public School	13.58 ±4.55	9.74 ±6.27	10.75 ±5.59	18.64 ±9.80	8.69 ±5.75	20.58 ±10.95	7.89 ±5.10	23.93 ±7.78	14.91 ±5.51
Private School	14.35 ±4.84	8.40 ±4.18	9.14 ±3.41	18.19 ±10.61	7.02 ±3.45	19.95 ±10.41	7.73 ±2.57	23.17 ±9.25	15.19 ±6.91
p	0.651	0.493	0.345	0.903	0.340	0.873	0.917	0.806	0.899

TABLE 3
%BF OF MATURED AND NON MATURED ADOLESCENTS OF DIFFERENT SOCIAL AND ECONOMICAL LEVELS

Skinfolds thickness	%BF Classification (Deurenber,1990)	FM (kg)	RM (kg)	BM (kg)	MM (kg)
Matured					
Public School	22.94 ±6.15 (Excellent)	10.95 ±4.60	10.15 ±1.98	8.91 ±0.92	18.57 ±2.89
Private School	23.19 ±3.73 (Excellent)	12.09 ±3.93	10.65 ±1.89	9.49 ±1.021	18.71 ±2.72
P	0.870	0.365	0.387	**0.049**	0.871
Non Matured					
Public School	22.47 ±5.67 (Excellent)	9.97 ±4.64	9.27 ±2.07	8.85 ±1.36	16.26 ±2.73
Private School	21.18 ±6.13 (Excellent)	9.28 ±4.22	8.82 ±1.83	8.25 ±1.24	15.87 ±2.98
P	0.545	0.671	0.531	0.204	0.702

Perimeters: The matured adolescents of private school presented greater perimeter of mid- thigh of that of the public (Table 4). This result can express the higher accumulation of fat found in this region for these adolescents. The non matured adolescents did not present significantly differences statistics for this anthropometric measure.

TABLE 4
PERIMETERS OF MATURED AND NON MATURED ADOLESCENTS OF DIFFERENT SOCIAL AND ECONOMICAL LEVELS

	Arm (relaxed) (cm)	Arm (contracted) (cm)	Calf (cm)	Mid-Thigh (cm)	Waist (cm)	Hip (cm)
Matured						
Public School	21.86 ±2.28	23.48 ±2.35	31.56 ±3.04	44.56 ±5.57	63.15 ±5.30	86.00 ±7.42
Private School	22.91 ±2.47	24.22 ±2.62	32.74 ±2.80	48.50 ±5.50	63.78 ±6.17	88.50 ±7.80
P	0.137	0.312	0.173	**0.019**	0.706	0.267
Non Matured						
Public School	21.59 ±2.67	23.16 ±2.59	30.63 ±3.32	44.44 ±5.00	61.97 ±7.70	81.66 ±8.39
Private School	21.00 ±2.60	22.37 ±2.56	29.97 ±2.98	44.39 ±5.23	60.23 ±6.36	80.00 ±9.26
P	0.536	0.401	0.563	0.978	0.501	0.605

Bone diameters: Were not found significantly differences between the groups. The biepicondilar measure (femur) show a tendency to higher value for the group of the private school (Table 5).

TABLE 5
BONE DIAMETERS OF MATURED AND NON MATURED ADOLESCENTS OF DIFFERENT SOCIAL AND ECONOMICAL LEVELS

	Bistyloideus (cm)	Biepicondilar Femur (cm)	Biepicondilar Humerus (cm)
Matured			
Public School	5.08 ±0.28	9.25 ±0.53	6.04 ±0.33
Private School	5.24 ±0.34	9.61 ±0.74	6.10 ±0.58
P	0.096	0.061	0.695
Non Matured			
Public School	5.19 ±0.40	9.41 ±0.86	6.25 ±0.66
Private School	5.03 ±0.35	9.07 ±0.70	6.03 ±0.40
P	0.267	0.241	0.281

Hearth Rate of Rest (HRr): The matured adolescents of the public school presented HRr lower (84.30 ±14.10 bpm) than the private school (97,78 ± 17,70 bpm) with a significantly difference (p = 0.006). The matured adolescents of the public school presented HRr lower (85.47 ±10.70 bpm) than the private adolescents (104.40 ±17.94 bpm) (p = 0.002).

Physical fitness testing: Were observed significantly differences for the abdominal, with higher values for the adolescents of private school; hand grip test, with higher values in the public school; sit and reach, where the private school obtained best results than the public school and the bent arm hang , where the adolescents of the public school resisted for more time the test (Table 6).

TABLE 6
PHYSICAL FITNESS TESTING OF MATURED AND NON MATURED ADOLESCENTS OF DIFFERENT SOCIAL AND ECONOMICAL LEVELS

		Public School		Private School		p
Matured						
Variables		Mean	SD	Mean	SD	
ABDOMINAL	(repetitions, 30s)	11.13	5.70	16.22	3.62	**0.001**
HAND GRIP right	(kg)	22.93	4.44	21.11	5.28	0.211
HAND GRIP left	(kg)	21.83	4.06	19.26	5.00	0.063
SHUTTLE RUN endurance	(time, s)	12.17	1.42	12.42	1.46	0.553
SHUTTLE RUN velocity	(time, s)	25.94	3.61	25.76	3.75	0.866
SIT AND REACH	(length, cm)	49.42	10.01	56.58	11.91	**0.033**
FLAMINGO BALANCE	(nº attempts)	3.78	2.11	3.85	2.67	0.910
NELSON SPEED OF MOVEMENT TEST	(length, cm)	28.60	6.58	26.57	7.17	6.585
TAPPING TEST OF ARMS	(time, s)	13.42	4.13	14.92	7.08	0.386
BENT ARM HANG	(time, s)	14.95	14.31	5.59	5.97	**0.007**
STANDING BROAD JUMP	(length, cm)	122.59	34.02	123.39	17.90	0.921
Non Matured						
ABDOMINAL	(repetitions. 30s)	13.33	6.13	18.27	4.46	**0.018**
HAND GRIP right	(kg)	18.07	3.79	18.43	4.89	0.820
HAND GRIP left	(kg)	17.97	3.23	17.20	4.30	0.585
SHUTTLE RUN endurance	(time,. s)	12.68	1.58	12.13	1.01	0.266
SHUTTLE RUN velocity	(time, s)	23.90	2.72	25.23	2.92	0.207
SIT AND REACH	(length, cm)	52.13	11.47	53.98	6.55	0.593
FLAMINGO BALANCE	(nº attempts)	5.23	2.39	1.88	2.36	**0.005**
NELSON SPEED OF MOVEMENT TEST	(length. cm)	32.04	6.70	22.56	6.07	**0.0003**
TAPPING TEST OF ARMS	(time, s)	16.21	4.11	13.32	8.25	0.235
BENT ARM HANG	(time, s)	12.06	8.10	6.58	5.47	**0.043**
STANDING BROAD JUMP	(length, cm)	127.93	26.64	137.93	22.47	0.269

DISCUSSION

When the social and economical level is taken in consideration in the analysis of values of body fat, exists many divergences between the authors. Some authors believe that one high social and economical level would be a great influenciator for the appereance of the obesity (Guedes, 1980), therefore would make possible the access to the computer, TV, video game, musical education that are activities that keep the person inactive for long periods (Guedes, 2001). Our data do not allow affirming that these differences intervene directly in body composition of the adolescents, a time that was not observed predominance of a group in relation to the other.

Already in relation to the motor ability some studies have investigated the ethnic differences how the physical fitness (Cintra Filho, 1994; Guedes, 1991). Of one it forms generality the results are favorable to the black children when compared with the white, a non controlled factor in our study in view of the racial miscegenation characteristic of our population.

Our findings suggest that more studies be produced relating physical fitness with social and economical level considering that were found some differences for these variables.

CONCLUSIONS

After the biological maturation, although the adolescents of the private school be younger (high social and economical level), presented greater accumulation of fat in the members (biceps and mid-thigh) of that of the public school (low social and economical level), without that this increased adiposity had determined difference in the relative body fat. The biggest bone mass of the group of the private school is a positive factor. The physical fitness did not suffer influence from the social and economical level, at time that it did not have a predominance of better results for one of the groups. Bigger force of superior member in the adolescents of the public school and bigger force of abdominal muscles and flexibility (reach) in the adolescents of the private school was observed.

For the adolescents biologicaly non matured, the different social and economical level did not determine significantly differences for body composition. The differences in physical fitness did not determine predominance of one of the groups. It is standed out the expressive result obtained by the adolescents of public school in the bent arm hang (higher superior member force).

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BODY COMPOSITION AND PHYSICAL FITNESS OF ADOLESCENTS OF DIFFERENT SOCIAL AND ECONOMICAL LEVEL

The analysis of physical changes occurred during the process of growth and development, such as the physical fitness conditions, is so important for to detect and prevent the no health development of the adolescents and children. Thus, the aim of this study was analyze the body composition and physical fitness of 76 adolescents (10-15 years), considering the biological maturation and the social and economical level. The body composition was estimated through the measurements of skinfolds thickness, body perimeters, bone diameters, height and total body mass. These measurements permitted estimate the parameters: relative body mass, fat mass, residual mass, bone mass, and muscle mass. The body mass index and the somatotype and its respective classifications were obtained. Physical fitness testing were applied to establish the comparison between the groups: flamingo balance, tapping test of arms, sit and reach, standing broad jump, hand grip test, abdominal test, bent arm hang, velocity shuttle run and endurance shuttle run. The biological maturation was estimated by the presence or absence of menarche, and the social and economical level was done by the discrimination of school (public or private). The comparison between the groups was done by the t-Student test non pareated ($p = 0.05$). The results obtained in the present study show that the social and economical level wasn't determinant factor of significant differences between the studied adolescents.

Key words: adolescents, body composition, biological development.

COMPOSITION DE CORPORAL ET CONDITION PHYSIQUE DES ADOLESCENTS DU NIVEAU SOCIAL ET ÉCONOMIQUE DIFFÉRENT

L'analyse des changements physique pendent la croissance et le développement, tel que les conditions de santé physique, est si important pour détecter et empêcher le mauvais développement des adolescents et des enfants. Ainsi, le but de cette étude était analysent la composition corporal et condicion physique de 76 filles (10-5 ans), en prenant en considération la maturation biologique et le niveau social-économique. La composition corporal a été estimée par les mesures de l'épaisseur cutané, des périmètres corporal, des diamètres d'os, la taille et de la masse corporal total. Avec ses mesures les paramètres suivant ont été estimée: la masse relative de grosse, la masse de grosse, la masse résiduelle, la masse d'os et la masse de muscle. L'index de la masse corporel et le somatotype avec ses respectives classifications ont été obtenus. Testes physiques suivant ont été appliqués pour établir la comparaison entre les groupes: le flamingo test de équilibre, *taping test* de bras, *sit and reach,* saut en large, l'essai de poignée de main, abdominal, sutien pour des bras,*shuttle run* de vitesse et de résistance. La maturation biologique a été estimée par la présence ou l'absence du menarche, et le niveau social-économique a été fait par la discrimination de l'école (public ou privé). La comparaison entre les groupes a été faite par le t-Student test ($p= 0.05$). Les résultats obtenus en présente étude prouvent que le niveau social-économique n'était pas facteur déterminant des différences significatives entre les adolescents étudiés.

Mots clés : Adolescent, body composition, développement biologique.

COMPOSICIÓN DEL CUERPO Y CONDICIONES FÍSICAS DE ADOLESCENTES DE DIVERSO NIVEL SOCIAL Y ECONÓMICO

El análisis de los cambios físicos que ocurrió durante el proceso del crecimiento y el desarrollo humano, tal como las condiciones de la buena salud, es importante para detectar y prevenir el mal desarrollo de la salud de los adolescentes y niños. Así, le objetivo de este estudio era analiza la composición corporal y física de 76 adolescente (10-15 años), en vista de la presenta de maduración biológica y del nivel social-económico. La composición del cuerpo era estimada con las medidas del gruesos de dobleces cutáneos, de los perímetros del cuerpo, los diámetros del hueso, de la altura y de la masa de cuerpo entero. Estas medidas permiten estiman los parámetros: masa relativa de grasas de cuerpo, masa de grasas, masa residual, masa del hueso y masa del músculo. El índice de la masa del cuerpo y el *somatotype* y sus clasificaciones respectivas fueron obtenidos. Las siguientes pruebas físicas fue aplicada para establecer la comparación entre los grupos: el balance del flamenco, prueba agilita de brazos, se sienta y alcanza, salto de longitud, la prueba del apretón de la mano, la prueba abdominal, el sustentación por les brazos, el *shuttle run* de la velocidad y el de la resistencia. La maduración biológica era estimada por la presencia o la ausencia de la monarquía (*menarche*), y el nivel social-económico fue hecho por la discriminación de la escuela (público o privado). La comparación entre los grupos fue hecha por el t-*Student* no paréate ($p=0.05$). Los resultados obtenidos en el actual estudio demuestran que el nivel social-económico no era factor determinante de diferencias significativas entre los adolescentes estudiados.

Palabras claves: adolescente, composición del cuerpo y desarrollo biológico.

COMPOSIÇÃO CORPORAL E CONDIÇÃO FÍSICA DE ADOLESCENTES DE NÍVEL SOCIAL E ECONÔMICO DIFERENTES

A análise das mudanças físicas ocorridas durante o processo de crescimento e desenvolvimento, assim como a condição física, é de suma importância para a detecção e prevenção de alterações que impedem o desenvolvimento saudável. Assim, o objetivo do estudo foi analisar a composição corporal e condição física de 76 escolares do sexo feminino (10 - 15 anos), considerando a maturação biológica e o nível sócio-econômico. A composição corporal foi estimada através de medidas de espessura de dobras cutâneas, perímetros corporais, diâmetros ósseos, estatura e massa corporal total. Tais medidas permitiram estimar os parâmetros: gordura corporal relativa, massa gorda, massa residual, massa óssea e massa muscular. Foram também obtidos o Índice de Massa Corporal e o somatotipo com suas respectivas classificações. Testes motores foram aplicados a fim de estabelecer a comparação entre a condição física: *flamingo, tapping test de membro superior*, *sentar e alcançar,* teste *de* i*mpulsão horizontal*, *teste de preensão manual*, *teste abdominal*, *suspensão na* barra, *shutle r*un de velocidade, e *shutle run* de endurance. A maturação biológica foi estimada por meio da presença ou ausência da menarca, e o nível sócio-econômico se deu através da discriminação do estabelecimento escolar (público ou particular). Para comparação entre os grupos adotou-se o teste *t-Studente* não pareado (p0,05). Os resultados obtidos no estudo mostraram que o nível sócio-econômico não determinou diferenças marcantes entre as adolescentes estudadas.

Palavras-chaves: adolescentes, composição corporal e desenvolvimento biológico.