

## 45 - CORRELATIONAL STUDY BETWEEN TWO TYPES OF PROTOCOL FOR BODY COMPOSITION IN SCHOOLCHILDREN OF JUAZEIRO DO NORTE, CE, BRAZIL

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### INTRODUCTION

The accuracy of researches seeking to involve population surveys, especially among children and adolescents has increased a lot in recent years. Studies involving anthropometric evaluate, especially with body mass, have been more used to evaluate the nutritional status and growth regulation in young people, and through this method cases of malnutrition or obesity can be detected. The assessment of nutritional status is to verify the growth and body proportions in an individual or a group, trying to establish attitudes of intervention. So, it is extremely important to standardize an assessment protocol to be used for each age group, thus standardizing the criteria used by the health team.

According to Guedes e Guedes (1998) anthropometry is a technique for measuring external dimensions of the body, framed in the kin anthropometry which aims to measure weight, height, diameter, thickness of the human fat tissue. These measurements become potential methods when used for the study of body composition, which assesses the quantification obtained by anthropometric measurements. For the fractionation of body composition, there are many laboratory techniques such as (computer tomography, hydrostatic weighing, magnetic resonance, bioelectrical impedance, etc.), however, even if they show high accuracy in their results, they also present a rather limited use because it is hard to include the assess people on the tests, mainly by its high cost.

Thus, it is feasible to use anthropometric measures that are less sophisticated, but less expensive and have a good correlation with laboratory methods (FARINATTI; MONTEIRO, 1992). Factors such as growth and development, nutritional status and physical activity standard remain in constant change, occurring a dynamics of the structural components of the human body. Therefore, the human body composition changes over the whole life (DE ROSE et al. apud Costa, 1989).

The measurement of growth is far the best definition of the health and nutritional status of children and adolescents, because disturbances in health and nutrition, regardless of their etiology, invariably affect growth. In developing countries, most of the problems of health and nutrition during childhood and adolescence are related to almost inadequate food habits, and these two conditions are closely related to the population standard of living, which includes access to food, shelter and health care. Thus, then, the assessment of growth is also an indirect measure of quality of life of the population.

In the case of techniques that measure the body fat percentage of children from measurements of circumference, nothing was found in several literatures that address this issue. As claimed by Torres e Silva (2003), a method still little known in Brazil for predicting the amount of body fat is the one that use measures of circumference, although it is a very viable resource, especially at schools, with a view to practical handling of the tape measure and the low financial cost. Therefore our study aims to analyze the body composition obtained by the methods of skin folds thickness and circumference of schoolchildren.

### METHODOLOGY

This research follows a study of a descriptive, cross-sectional quantitative and field nature. The sample consists of 79 students (37 males and 42 females), mean age 16 + 1,1 years, coming from the Federal Institute of Education Science and Technology (IFCE), campus Juazeiro do Norte, Ceará. All of the characters had an analysis of body composition from two types of evaluation to measure skin fold thickness and sub scapular and estimated the fat percentage (%BF) from the equation of Slaughter (1988) and measure the perimeter of the proximal thigh (cm) and the body mass (kg), for performing the calculation of estimates for %BF from the prediction of lean body mass (LBM) developed by Yonamine (SOUSA, 2008).

We applied descriptive statistics of measures of central tendency and dispersion. We used the Kolmogorov-Smirnov test to verify the normality of the distribution of sample data. After verifying the presence of some outliers (extreme values considered) and that compromised the normal distribution, it was decided to withdraw them. Out using inferential statistics with "t" test of Student for independent variables to verify the differences between genders and to determine the correlation between the r of Pearson and %BF and lean body mass (LBM) under the methods.

### RESULTS AND DISCUSSION

The results of descriptive statistics, shown in table 1, exhibit medium values for weight, lean body mass and fat percentage in the method of circumferences, higher in males, and the other figures are higher for girls. Also seen that in a study of adolescents of Mascarenhas et al. (2005), where females had significantly higher values than boys in relation to the percentage of fat.

This can be explained by the fact that girls matures faster than boys and no longer perform certain physical activities, becoming possible sedentary (EVELETH; TANNER, 1990). Observed that the boys had relatively higher values for %BF as the circumferences, according to the formula for calculating the LBM used, one of its variables in use is the perimeter of the thigh, and also presented high values for them, such as using the perimeters takes into account the muscle and bone tissues. The fat tissue question becomes something of a summation with others and not the master, as in other types of methods.

Complementing this idea, Marcondes (1994), Malina e Bouchard (2002) confirm the fact that girls have the beginning of the maturation process before boys, and in the pubertal stage, the sexual differences generated by maturation provide increased accumulation of fat in adipocytes in girls, and boys gain muscle mass; another attempt of explanation, it is also because the equation used to estimate the fat percentage, although widely used in Brazilian studies, a variation may have been developed by the from another population. In both methods it can be observed a significant difference in body composition (circumference method = 0.000 and skin folds method = 0.019), so there outliers values in relation to genders.

Table 1 - Descriptive variables for weight, perimeter of the proximal thigh, triceps folds, subscapular skin fold, lean body mass (LBM) and the method of circumference, LBM for the skin folds method, fat percentage (%BF) about the method of

circumference and %BF for the skin folds.

	MAIN		MEN				WOMEN			p
	Min	mean	Max	sd	Mini	Mean	Maxi	sd		
Weight	37,5	60,5	85,9	10,8	39,7	52,3	71,0	8,3	0,000*	
Proximal Thigh Perimeter	41,9	52,5	66,5	5,9	44,5	54,1	65,9	5,3	0,193	
Tricipital Fold	5,4	12,0	30,2	6,3	8,2	15,8	29,9	4,7	0,003*	
Subscapular Fold	6,6	13,6	31,9	6,9	7,2	14,8	31,6	5,6	0,384	
LBM - Circumference	34,0	52,0	70,7	8,3	33,7	43,1	59,0	6,4	0,000*	
LBM - Skin Folds	8,3	13,7	19,8	2,8	9,4	17,4	22,2	3,0	0,000*	
%BF - Circumference	32,5	47,1	62,9	6,8	28,9	38,6	50,1	4,6	0,000*	
%BF - Skin Folds	9,3	20,6	56,1	12,2	15,1	25,7	43,3	5,8	0,019*	

According to Fernandes Filho (2003), among the doubly indirect methods, measures of skin fold thickness are the most used and recommended in the prediction of body fat percentage. Confirming this, we can consider the circumference an effective method of calculation of the LBM, since it showed a strong correlation value (0,726) when compared to the other method, making it not representative for the body composition (0,573). In the study by Pinto et al. (2007) by the sum of the circumferences as a predictor for estimation of body composition confirms a positive correlation, thus indicating the measures of circumferences to be used as alternative technique in detecting malnutrition on overweight or obesity.

Table 2 – Correlations between variables

	1	2	3	4	5	6	7	8
LBM <sup>1</sup>	X	0,726*	-0,035	0,358	0,563	0,272	0,515	0,978**
LBM_FAT <sup>2</sup>	0,726*	x	-0,246	-0,335	0,200	-0,345	-0,121	0,656
LBM_PERC <sup>3</sup>	-0,035	-0,246	x	0,573	0,796*	0,607	0,473	0,173
FAT_PERC <sup>4</sup>	0,358	-0,335	0,573	x	0,709*	0,931**	0,906**	0,479
PER_THIGH_PRO <sup>5</sup>	0,563	0,200	0,796*	0,709*	x	0,690	0,725*	0,725*
DB_TRIC <sup>6</sup>	0,272	-0,345	0,607	0,931**	0,690	x	0,794*	0,402
DB_SUB <sup>7</sup>	0,515	-0,121	0,473	0,906**	0,725*	0,794*	X	0,614
WEIGHT <sup>8</sup>	0,978**	0,656	0,173	0,479	0,725*	0,402	0,614	x

\*Strong Correlation.

\*\*Very Strong Correlation.

## CONCLUSION

The study, according to the sample, permits us to conclude that:

The evaluate method by skin folds, to the fat percentage seems to be more reliable than the perimeter one, while the perimeter one, shows to be more tendency to the LBM, in adolescents students.

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## CORRELATIONAL STUDY BETWEEN TWO TYPES OF PROTOCOL FOR BODY COMPOSITION IN SCHOOLCHILDREN OF JUAZEIRO DO NORTE, CE, BRAZIL

### ABSTRACT

The objective of this study is to analyze the body composition obtained by the methods of skin folds and circumference of schoolchildren in the Federal Institute of Education, Science and Technology, campus Juazeiro do Norte, CE, Brazil. Derive from a side study in a sample of 79 characters (37 males and 42 females), mean age 16.0 + 1.1 years, coming from the Federal Institute of Education, Science and Technology (IFCE), campus Juazeiro do Norte, Ceará, they were submitted to measuring of body composition by skin folds of triceps, sub scapular, to obtained the percentage of fat (% BF) by the equation of Slaughter (1988) and measure too, the perimeter of the proximal thigh(cm) and body mass(kg) to perform the calculation of estimates for %BF from the prediction of lean body mass (LBM) developed by Yonamine (SOUSA, 2008). The data analysis plan derives from a statistics program by the descriptive and conclusive with the t test of Student to independent samples and level of significance equal to 5%. The results had presented: average e sd equal to 47,2+8,6 and 42,6+7,14 to the LBM of a perimeter and folds, average and sd equal to 15,7+3,4 and 23,3+9,6 to the %BF of perimeter and folds respectively, after the conclusive test was done, a significant difference was shown p=(0,001) between males and females to the perimeter of LBM and to the folds and to the %BF too; the r correlation test of Pearson had pointed a low and positive correlation (r=0,573) for %BF, and at LBM, the presented values are high (r=0,726). Conclusions: The evaluate method by skin folds, to the fat percentage seems to be more reliable than the perimeter one, while the perimeter one, shows to be more tendency to the LBM, in adolescents students.

**KEY WORDS:** Adolescents, body fat, body composition.

### ÉTUDE DE CORRÉLATION ENTRE DEUX TYPES DE PROTÉCOLES POUR LA COMPOSITION CORPORELLE CHEZ LES ÉTUDIANTS DE JUAZEIRO DO NORTE, CE, BRÉSIL.

#### RÉSUMÉ

L'objectif de l'étude a été d'analyser la composition corporelle obtenue par les méthodes de plis cutanés et la circonférence chez les étudiants de l'Institution Fédérale d'Éducation, Sciences et Technologie de Juazeiro do Norte, Ceará, Brésil. L'échantillon constitué 79 sujets (37 hommes et 42 femmes), d'âge moyen de  $16,0 \pm 1,1$  ans, de l'Institution Fédérale d'Éducation, Sciences et Technologie (IFCE) de Juazeiro do Norte, Ceará. Tous les sujets ont été soumis à l'analyse de la composition corporelle des plis cutané du triceps et sous-scapulaire, le pourcentage de graisse (%G) a été obtenu à partir de l'équation Slaughter (1988) et la mesure du périmètre de la cuisse proximale (cm) et de la masse corporelle maigre (MCM) Yonamine, 2001 apud Sousa, 2008, pour la réalisation du calcul estimatif de %G. Il a été utilisé un programme statistique d'analyse descriptive et inférentielle pour les test "t" de student des données isolées, avec niveau de signification de 5%. Les résultats de MCM, des sexes masculin e féminin respectivement, a travers les deux méthodes, ont présenté des valeurs distantes (MCM-plis cutanés =  $47,2 \pm 8,6$  et  $42,6 \pm 7,14$  et MCM-périmètre =  $15,7 \pm 3,4$  e  $23,3 \pm 9,6$ ), il a été trouvé des différences significative pour le sexes masculin, a travers le test "t" de Student ( $p=0,001$ ). La même chose a été constaté pour le %G (%G périmètre-plis cutanés =  $15,7 \pm 3,4$  e  $23,3 \pm 9,6$ ), il a été trouvé des différences significatives pour le sexe féminin ( $p = 0,001$ ). Lors du test de corrélation "r" de Pearson, il a été observé une corrélation positive et modérée ( $r = 0,573$ ) pour le %G, quant an MCM les valeurs trouvés sont à élevé ( $r = 0,726$ ). Conclusions: La méthode d'évaluation par les plis cutanés, pour le pourcentage de masse grasse, semble être plus efficace que la méthode de périmétrie, alors que la périmétrie semble plus favorable pour le MCM chez les élèves adolescents.

**MOTS-CLÉS:** adolescents, graisse, composition corporelle.

### ESTUDIO DE CORRELACION ENTRE DOS TIPOS DE PROTOCOLOS PARA COMPOSICIÓN CORPORAL EN LA ESCUELA JUAZEIRO DO NORTE, CE, BRASIL.

#### RESUMEN

El objetivo de este estudio es analizar la composición corporal obtenidos por los métodos de los pliegues cutáneos y la circunferencia de los escolares de Instituto Federal de Educación, Ciencia Y Tecnología del Juazeiro do Norte, Ceará, Brasil. De ello se desprende de un estudio transversal en una muestra de 79 sujetos (37 varones y 42 mujeres), edad promedio  $16,0 \pm 1,1$  años, procedentes de la Instituto Federal de Educación, Ciencia Y Tecnología (IFCE) del Juazeiro do Norte, Ceará, con sujeción a las medidas del espesor del pliegue cutáneo del tríceps y subescapular, la equiparación del porcentaje de grasa corporal (%G) de la Slaughter de protocolo (1988) y la circunferencia del muslo proximal (cm) y peso (kg), para realizar el cálculo de la estimación de %G de la predicción de la masa corporal magra (MCM), desarrollado por Yonamine (Sousa, 2008). El plan de análisis de datos estaba en el programa de estadística a través de estadística descriptiva e inferencial con la prueba t de Student para muestras independientes y el nivel de significación del 5%. Los resultados mostraron: media y desviación estándar de  $47,2 \pm 8,6$  y el  $42,6 \pm 7,14$  para la perimetría MCM y pliegues, media y desviación estándar de  $15,7 \pm 3,4$  y  $23,3 \pm 9,6$  BF% de la perimetría y pliegues, respectivamente, realizado después de la prueba inferencial mostró una diferencia significativa (0,001) entre los hombres y mujeres para MCM y el perímetro de la pliegues, se presenta a la G% ( $p = 0,001$ ), la prueba de correlación "r" de Pearson, se indica una relación positiva y baja ( $r = 0,573$ ) para %G, como el medio de MCM a alta ( $r = 0,726$ ). Conclusiones: El método de evaluación por pliegues de la piel, por el porcentaje de grasa, parece ser más eficaz que el método de la perimetría, mientras que la perimetría parece ser más favorable para los MCM en estudiantes adolescentes.

**PALABRAS CLAVE:** Adolescentes, la grasa, composición corporal.

### ESTUDO CORRELACIONAL ENTRE DOIS TIPOS DE PROTOCOLOS PARA COMPOSIÇÃO CORPORAL EM ESCOLARES DO JUAZEIRO DO NORTE, CE, BRASIL.

#### RESUMO

O objetivo do estudo é analisar a composição corporal obtida pelos métodos de dobras cutâneas e perimetria em escolares do Instituto Federal de Educação, Ciência e Tecnologia, campus Juazeiro do Norte, CE, Brasil. Decorre de um estudo transversal, em uma amostra de 79 sujeitos (37 do gênero masculino e 42 do feminino), com média de idade  $16,0 + 1,1$  anos, oriundos do Instituto Federal de Educação, Ciência e Tecnologia (IFCE), campus Juazeiro do Norte, CE, submetidos às medidas de dobras cutâneas de tríceps e subescapular, para equacionar o percentual de gordura (%G) a partir do protocolo de Slaughter (1988) e perímetro de coxa proximal (cm) e massa corporal (kg), para realização do cálculo de estimativa para o %G a partir da predição de massa corporal magra (MCM) desenvolvido por Yonamine (SOUSA, 2008). O plano de análise dos dados deu-se em programa estatístico por meio da descritiva e inferencial com teste "t" de Student para amostras independentes e nível de significância de 5%. Os resultados apresentaram: médias e dp de  $47,2 \pm 8,6$  e  $42,6 \pm 7,14$  para o MCM de perimetria e dobras, média e dp de  $15,7 \pm 3,4$  e  $23,3 \pm 9,6$  para o %G de perimetria e dobras respectivamente, após realizado o teste inferencial apresentou-se diferença significativa (0,001) entre o grupo masculino e feminino para MCM da perimetria como para o de dobra, sendo apresentado para o %G também ( $p=0,001$ ); o teste de correlação "r" de Pearson, indicou correlação positiva e baixa ( $r=0,573$ ) para o %G, quanto a MCM média para alta ( $r=0,726$ ). Conclusões: O método de avaliação por dobras cutâneas, para o percentual de gordura, parece ser mais eficaz do que o método de perimetria, enquanto que o de perimetria se mostra mais propício para a MCM, em adolescentes escolares.

**PALAVRAS-CHAVE:** Adolescentes, gordura, composição corporal

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