2 - INDICES OF BODY COMPOSITION RELATED TO PHYSICAL FITNESS FOR THE HEALTH OF ADULT WOMEN FROM THE WEST ZONE OF RIO DE JANEIRO

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INTRODUCTION

Body composition is considered a component of physical fitness for the health, because of the relationship between the quantity and distribution of body fat that trigger changes in the level of physical fitness and health status of people (AMERICAN COLLEGE OF SPORTS MEDICINE - ACSM, 2007).

Recently the study of body composition, particularly in relation to body fat and lean body mass, has became a factor important research because it allows you to specify the proportions (HEYWARD & STOLARCZYK, 2000).

One of the most frequently ways used to assess body composition was hydrostatic weighing, but recently, imaging techniques such as Magnetic Resonance, Computed Tomography and X-ray absorptiometry with dual energy (DEXA), have been alternatives, but cost and lack prevent the equipment prevented the use these techniques in clinical practice (ERSELCAN et al., 2000).

According to Molarius et al. (1999), the best option for clinical evaluation of body composition is the combination of body mass and fat distribution, which can be measured by calculating the anthropometric measurements, which are used as instruments to predict health risk and risk factors for overweight, obesity, physical inactivity, stress and cardiovascular disease (SMITH et al., 2004).

The calculation of body mass index (BMI) has been widely used to assess weight and obesity, with high specificity and sensitivity, yet the BMI alone does not fully correlate with the proportion and distribution of body fat (AMORIM et al. 2004). Therefore, anthropometric markers, such as waist circumference (WC), waist hip ratio (WHR) and percentage body fat (%BF) have been used in several epidemiological studies (JANSSEN; KATZMARZYK; ROSSI, 2004).

Some procedures are used to estimate %BF, as the measurement of skinfold thickness, bioelectrical impedance and ultrasound, although more efficient techniques, are limited when used in epidemiological studies due to its high cost and methodological difficulties (Oliveira et al., 2010). However, the %BF can be estimated by the anthropometric equations, using, for example, age and BMI (Lean et al. 1996; Deurenberg et al., 1991), which allow easy measurement and validity have to perform studies in different samples (RECH et al., 2010).

Thus it is necessary to study the relationships between equations estimating %BF and BMI for age and anthropometric measurements related to physical fitness for health, for there is evidence that they associate themselves with the level of physical fitness and risk to health (ACSM, 2007). So the purpose of this study was to investigate the relationship between body composition variables for the measures of %BF estimated using equations for BMI and age and be justified by a simple procedure for assessing body composition, whose study of their relationships can contribute to evidence for use of the equations properly.

The relevance of the study is to give the sample subjects information about their real conditions and indices of body composition associated with physical fitness for the health, contributing to evidence about the possible indications that trigger weight gain and body fat. Therefore, the aim of the study was to compare and correlate measures of %BF estimated by BMI with measures of WC, BMI and WHR.

METHODOLOGY

The sample consisted of 83 adult women residents of the West Zone of Rio de Janeiro with a mean of 27.59 ± 8.86 years old. The same was selected in a non-probability, considering that were part of it which are voluntary only had access. Data were collected during the week of the Course of Physical Education at Universidade Castelo Branco (UCB) – RJ, knowing that for the study was respected the law 196/96 of the National Health Council, which deals with the research norms humans in Brazil.

To perform the anthropometric measurements used a digital scale Techline BAL-150 type platform with a capacity of 150 kilograms and 100 grams scale, a Sanny Anthropometric tape measure 2 meters and Medical Seca Bodymeter 208 stadiometer.

In order to correlate measures of body composition associated with physical fitness for health, it was held to measure BMI from measurements of body mass (kg) by height (m) squared, to determine abdominal fat were obtained measures WC and WHR classified according to the cutoffs of the World Health Organization - WHO (1998). All anthropometric and anatomical reference points were collected by Pompeu (2004).

To determine the distribution of body fat were used equations to estimate %BF, through BMI and age as that of Deurenberg et al. (1991) for both sexes (%BFD = (1.2 * BMI) + (0.23 * age) - 5.4)) and gender specific equation for women of Lean et al. (1996) (%BFL = (1.21 * BMI) + (0.262 * age) - 6.7), which allows easy measurement of %BF and have validity to perform studies in different samples (RECH et al., 2010).

Statistical analysis was performed using SPSS, version 17.0. Was initially submitted to descriptive analysis of variables by mean and standard deviation, then all variables were tested for normality by Kolmogorov-Smirnov test. The Wilcoxon test was applied to verify the existence or no significant differences between %BFD and %BFL.

The linear correlation coefficient of Pearson(r) was used to assess the level of correlation among the %BF by Lean et al. (1996) and %BF by Deurenberg et al. (1991) for BMI, WC, and WHR, and the confidence level of $p<0.05$ and confidence interval 95% for all inferential analysis.

RESULTS

Table 1 shows the mean and standard deviation (SD) of BMI measurements, WHR, WC, %BFL and %BFD, were used for classification of the cutoff points recommended by WHO (1998). The sample had lower BMI (24.53 ± 4.29) within the normal range, as well as WHR (0.76 ± 0.06) and WC (76.14 ± 10.32), however the average %BFL (30.21 ± 6.37) and %BFD (30.38 ± 6.15) gave values of risk to health. The Wilcoxon test indicated a significant difference between %BFL and %BFD.

Table 1. Mean and standard deviation of anthropometric measures of body composition.

Variables	BMI (kg/m2)		WHR		WC (cm)		%BFL	%BFD
Classification	Normal	Alteration	Normal	Alteration	Normal	Alteration	Normal	Alteration
	< 25	≥ 25	< 0,80	≥ 0,80	< 80	≥ 80	< 23%	≥ 23%
Mean and SD	24,53 ± 4,29		0,76 ± 0,06		76,14 ± 10,32		30,21 ± 6,37*	30,38 ± 6,15*

*Significant difference between %BFL and %BFD was considered p <0.05.

In Table 2 it is possible to observe the correlation between the %BFL and %BFD with the anthropometric indicators of body composition. To study the levels of correlation was used the classification proposed by Santos (2008).

Table 2. Correlation among anthropometrics variables with %BF.

Variables	BMI(kg/m2)	WC(cm)	WHR
%BFL	r = 0,939	r = 0,527	r = 0,498
%BFD	r = 0,950	r = 0,535	r = 0,499

The correlation was most evident between %BFL and BMI (r = 0.939), being characterized as strong positive, between %BFL and WC (r = 0.527) showed a moderate positive correlation and WHR with %BFL (r = 0.498) the correlation was weak positive. The results of the correlation between %BFD and BMI (r = 0.950) was a strong positive and WC and %BFD (r = 0.535) showed moderately positive correlation. However WHR and %BFD (r = 0.499) the correlation was weak.

Seen as measures of BMI, WHC and WC were classified as normal to the sample, however the values %BFD and %BFL were associated with risk to health. Oliveira et al. (2010), investigating the relationship between anthropometric indices with risk factors for cardiovascular disease, found similar values for BMI (24.70 ± 5.05), WC (76.4 ± 11.3), WHR (0.75 ± 0.69) and for %BF (31.29 ± 4.92).

It must be considered that the increase in body fat, especially around the abdomen, can make limited use of BMI, being important to realize the combination of other anthropometric measurements to improve the efficient (AMORIM et al., 2004, CAVALCANTI; CARVALHO; BARROS, 2009, REZENDE et al., 2010).

In this study, BMI was strongly correlated with %BFL and %BFD and among WC with %BFD and %BFL the correlation was moderately positive. However WHR had the lowest correlation among the anthropometric indices. Similar results were found among the studies of Oliveira et al. (2010), in which we observed the same relationship between WC (r = 0.717) and WHR (r = 0.664) for %BF.

In a study by Rezende et al. (2010), which verifies the applicability of BMI in assessing body fat, it was observed that the BMI (r = 0.693) and WHR (r = 0.712) showed moderate correlation with the %BF, however were identified similar values to this study regarding the correlation between WC and %BF (r = 0.775).

In relation to body fat, the study by Piers et al. (2000), the BMI showed low sensitivity and high specificity in identifying individuals with excess body fat, which might justify such a strong correlation to %BF with BMI. Already in study Tossete, Olkoski and Matheus (2007) found that the differences among the values of anthropometric methods for estimating %BF, it was observed that specific equations or generalized equations can be used from the values of the circumference of a given segment for assessing body composition in women.

Furthermore there is evidence that the estimate of %BF may differ depending on the choice of the equation to estimate this variable (RECH et al., 2010), so the choice of the equation should consider the characteristics of the study in which it was developed, as well as the characteristics of the study to be done (FALCAO et al., 2009).

CONCLUSION

The study achieved its goal to get to compare and correlate measures of %BF estimated by BMI and age, it was verified that the equations of Deurenberg et al. (1991) and Lean et al. (1996) just had a strong positive correlation with BMI, and can thus use them in conjunction with BMI to determine demographics, body composition and health risk. However, the correlations between DC and ICQ with the equations %BFD and %BFL had significantly weaker, which does not allow us to propose the use of these equations with these variables to check the above conditions.

It is therefore suggested that new studies of correlation and comparison, using these equations related anthropometric indices in other populations with different characteristics, thus enabling the emergence of new evidence regarding the applicability of the equations for body composition assessment.

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INDICES OF BODY COMPOSITION RELATED TO PHYSICAL FITNESS FOR THE HEALTH OF ADULT WOMEN FROM THE WEST ZONE OF RIO DE JANEIRO.

ABSTRACT

Body composition is considered a component of physical fitness for the health, because of the relations between body fat and changes in the level of physical fitness and health (ACSM, 2007). The research objective was to compare and correlate measures estimated of body fat percentage (%BF) by body mass index (BMI) to measures with waist circumference (WC), waist hip ratio (WHR) and BMI. The sample consisted of 83 adult women residents of the West Zone of Rio de Janeiro in between of 27.59 ± 8.86 years old. To determine the distribution of body fat equations were used to estimate %BF by BMI and age, as proposed by Deurenberg et al. (1991) (%BFD) and Lean et al. (1996) (%BFL). We used the formula weight/height2 for calculating the BMI. The WC and WHR were used according to the references of WHO (1998). BMI, WC and WHR values were considered normal however %BFD and %BFL featured health risk, with significant differences between these two measures using the Wilcoxon test. The Pearson correlation coefficient(r) was strong positive correlation between BMI and %BFL (r= 0.939) and BFD% with BMI (r= 0.950), between WC with %BFL and %BFD the correlation was moderate, but among WHR with %BFD and %BFL the correlation was weak. As it was seen from the equations %BFD and %BFL had a strong positive correlation with BMI precisely, allowing the use of them, along with BMI to determine demographics, body composition and health risk. However the weakest levels in correlation among WHR and WC to %BFD and %BFL, do not allow us to propose the use of these equations with these variables to check the above conditions.

KEYWORDS: Body composition. Body fat. Body mass index.

INDICES DE COMPOSICIÓN CORPOREL RAPPORTÉS LÀ IDONEIDAD DE SALUD POUR LÀ MUJER ADULTE EN LÀ ZONE D'OUEST, RIO DE JANEIRO.

RESUMEN

La composition corporelle est considérée une composante de l'aptitude physique rapportée à la santé, dû aux relations existantes entre graisse corporelle et modifications à le niveau d'aptitude physique et dans l'état de santé (ACSM, 2007). L'objectif de l'étude a été comparer et corréler des mesures estimadas de pourcentage de graisse corporelle (%GC) par l'indice de masse corporelle (IMC) envers des mesures de circonférence de taille(CT), d'indice taille hanche(ITH) et d'IMC. L'échantillon s'est composé de 83 femmes adultes vivantes de la Zone ouest de Rio de Janeiro avec moyenne de 27.59 ± 8.86 ans d'âge. Pour déterminer la distribution de graisse corporelle ont été utilisées les équations d'estimation de la %GC, par IMC et d'âge, comme proposée de Deurenberg et al.(1991) (%GD) et Lean et al.(1996) (%GL). S'est utilisée la formule masse/estatura2 pour le calcul de l'IMC et les mesures de ITH et CT conformément aux références de WHO(1998). L'IMC, CT et ITH ont présenté des valeurs considérées normaux, néanmoins %GD et %GL ont caractérisé risque pour la santé, en étant observées différences significatives entre celui-là deux mesures par l'essai de Wilcoxon. La corrélation de Pearson(r) a été fort positive entre %GL et IMC (r=0.939) et %GD avec IMC (r=0.950), entre CT avec %GL et %GD la corrélation a été modérée, déjà entre ITH envers %GL et %GD la corrélation a été faible. Comme visa les équations de %GD et de %GL ont eu fort corrélation positive exactement avec IMC, en rendant possible l'utilisation de les mêmes, conjointement avec les valeurs d'IMC pour vérifier des données anthropométriques, de la composition corporelle et du risque pour santé. Néanmoins les niveaux le plus faible dans la corrélation ITH et de CT envers %GD et %GL, ne permettent pas de proposer l'utilisation de ces équations avec ces variables pour vérifier les conditions susmentionnées.

MOTS-CLÉS: composition corporelle. De graisse corporelle. Indice de masse corporelle.

ÍNDICES DE COMPOSICIÓN CORPORAL RELACIONADOS LA IDONEIDAD DE SALUD PARA LA MUJER ADULTA EN LA ZONA DE OESTE, RIO DE JANEIRO.

RESUMEN

La composición corporal se considera un componente de la aptitud física y la salud, debido a la relación entre la grasa corporal y los cambios en el nivel de aptitud física y la salud (ACSM, 2007). El objetivo fue comparar y correlacionar las medidas estimadas de porcentaje de grasa corporal (%G) por el índice de masa corporal (IMC), las medidas de la circunferencia de la cintura (CC), relación cintura cadera (RCC) y el IMC. La muestra consistió de 83 mujeres adultas residentes de la Zona Oeste de Río de Janeiro con una media de 27,59 ± 8,86 años de edad. Para determinar la distribución de la grasa corporal se utilizaron las ecuaciones de estimación %G por IMC y edad, según lo propuesto por Deurenberg et al. (1991)(%D) y Lean et al. (1996)(%L). Se

utilizó la fórmula para calcular el IMC masa/estatura2, CC y RCC se recogieron segundo la WHO(1998). Los valores de IMC, CC y RCC se considera normal, sin embargo %D y %L de riesgo de salud equipado, con diferencias significativas entre estas medidas de acuerdo con la prueba de Wilcoxon. La correlación de Pearson (r) fue fuerte correlación entre el IMC y %L (r=0,939) y %D con IMC (r=0,950), de %L y CC, %D con CC, la correlación fue moderada, pero entre RCC a con %L y %D la correlación fue débil. Las ecuaciones %D y %L había una fuerte correlación con el IMC, precisamente, lo que permite el uso de ellos, junto con el IMC para determinar la demografía, la composición corporal y el riesgo para la salud. Sin embargo, el más débil en la correlación con los niveles de CC y RCC con %D y %L, no nos permiten proponer el uso de estas ecuaciones con las variables para comprobar las condiciones anteriores.

PALABRAS CLAVES: La composición corporal. El porcentaje de grasa. Índice de masa corporal.

ÍNDICES DA COMPOSIÇÃO CORPORAL RELACIONADOS À APTIDÃO FÍSICA PARA SAÚDE EM MULHERES ADULTAS DA ZONA OESTE DO RIO DE JANEIRO.

RESUMO

A composição corporal é considerada um componente da aptidão física relacionada à saúde, devido às relações existentes entre gordura corporal e alterações no nível de aptidão física e no estado de saúde (ACSM, 2007). O objetivo do estudo foi comparar e correlacionar medidas estimadas de percentual de gordura corporal (%GC) pelo índice de massa corporal (IMC) para com medidas de circunferência de cintura (CC), índice cintura quadril (ICQ) e IMC. A amostra foi composta por 83 mulheres adultas moradores da zona oeste do Rio de Janeiro com média de 27,59 ± 8,86 anos de idade. Para determinar a distribuição de gordura corporal foram utilizadas as equações de estimativa do %GC, por IMC e idade, conforme proposta de Deurenberg et al. (1991) (%GD) e Lean et al. (1996) (%GL). Utilizou-se a fórmula massa/estatura2 para o cálculo do IMC e as medidas de ICQ e CC de acordo com as referências da WHO (1998). O IMC, CC e ICQ apresentaram valores considerados normais, todavia %GD e %GL caracterizaram risco para a saúde, sendo observadas diferenças significativas entre essas duas medidas pelo teste de Wilcoxon. A correlação de Pearson(r) foi forte positiva entre %GL e IMC (r= 0,939) e %GD com IMC (r= 0,950), entre CC com %GL e %GD a correlação foi moderada, já entre ICQ para com %GL e %GD a correlação foi fraca. Como visto as equações de %GD e %GL tiveram forte correlação positiva justamente com IMC, possibilitando a utilização das mesmas, juntamente com os valores de IMC para verificar dados antropométricos, composição corporal e risco para saúde. Entretanto os níveis mais fracos na correlação do ICQ e CC para com %GD e %GL, não permitem propor o uso dessas equações com essas variáveis para verificar as condições supracitadas.

PALAVRAS-CHAVE: Composição corporal. Percentual de gordura. Índice de massa corporal.