203 - RELATION AMONG ADIPOSITY INDEXES IN WOMAN AGED BETWEEN 45 AND 49 YEARS-OLD

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INTRODUCTION

The body mass index is easy to apply and has been used in epidemiologic studies to detect and to observe the evolution of the percentage of overweight and obese people (ACSM, 2001).

The waist circumference can be used as a health risk index because circumference classify people with risk for the development of pathologies as type 2 diabetes, hypertension and cardiovascular disease (ACSM, 2003).

Skinfolds measurements provide a better estimate of fatness and they are more difficult than other anthropometric methods that use circumferences, height and weight (ACSM, 2003).

The diseases associated with obesity are the development of cardiac coronary disease, hypertension, dyslipidemia, diabetes (WHO, 2002), cancer, hyperlipidemia and hyperinsulinemia (ACSM, 2001). The prevalence of obesity and overweight is associated with a higher risk for the mortality and morbidity (WHO, 2003).

The objective of this study was to examine the relation between adiposity indexes in women aged between 45 and 49 years of age.

METHODOLOGIC PROCEDURES

Population and sample

The sample was composed by 236 women aged between 45 and 49 years old and they were visitors of the coast of Parana State.

Procedures

The research instruments used were sphygmomanometer with scale of 2 mmHg and stethoscope appropriated; balance, scale of 100 grams to the body weight; stadiometer, centimeters scale to the height; anthropometric tape to the circumference, millimeters and caliper, to measure thickness to the skinfolds, milimeters.

For the anthropometric variables were used the following protocols: body weight (MC), body height (EST) and perimeter HEYWARD and STOLARCZYK (1996) and skinfolds, JACKSON and POLLOCK (1985). The procedures of ACSM (2003) were used to collect the resting blood pressure.

BMI was classified by the recomendations of WHO (1997); BMI normal when the values were between 18.5 and 24.9 Kg/m^2, BMI overweight between 25.0 and 29.9 Kg/m^2 and BMI obesity class I between 30.0 and 34.9 Kg/m^2.

Body density (D) was calculated by the predictive equation of JACKSON and POLLOCK (1985) that uses three skinfolds. The skinfolds (DC) used were triceps (TR), suprailiac (SI) and abdominal (ABD) and the equation is $D = 1.089733 - (0.0009245 \times DCTR+DCSI+DCABD) + (0.0000025 \times (DCTR+DCSI+DCABD)^2) - (0.0000979 \times AGE)$. The skinfolds were in millimeters and age in years.

Fat percentage was calculated by the equation of SIRI (1961) and this equation was indicated and utilized by JACKSON and POLLOCK (1985). The fat mass and the lean body mass were calculated by the procedures suggested by DE ROSE, PIGATTO and DE ROSE (1984).

Data treatment

For the statistics treatments were used:

1) descriptive statistics for the physiology, anthropometric and of body composition variables;

2) *One-Way* Anova and the *post-hoc* of Tukey, ($p < 0.05$), having as factor the body mass index and, the independent variable list which is the age, resting systolic and diastolic blood pressure, body mass, body height, waist perimeter, fat percentage, sum of skinfolds, fat mass and lean body mass. The classification of BMI with the values < 18.5 and of BMI > 34.9 Kg/m^2 was not used because there were few people in these classifications.

3) Pearson bivariate *two-tailed* correlation, where the variables analysed were body mass index, fat percentage, waist perimeter, lean body mass and age ($p < 0.05$).

4) multiple regression analisys, where the dependent variable was body mass index and independent variables were fat percentage, waist circumference, lean body mass and age.

RESULTS

The higher it was the classification of BMI, the higher were the mean values of resting systolic and diastolic blood pressure, body mass, waist perimeter, ? of triceps, abdominal and suprailiac skinfolds, fat percentage, fat mass and lean body mass (Table 1)

The obese group of BMI was classified in prehypertension by resting systolic and diastolic blood pressure. The normal and overweight group of BMI were classified in normal by resting systolic and diastolic blood pressure (CHOBANIAN et al., 2003).

The waist perimeter was classified in high risk for the emerging of cardiovascular disease in the obese group of BMI and in low risk in the normal and overweight group of BMI (BRAY, 2004).

The overweight and obese group of BMI were classified in risk for development of disease associated with obesity by fat percentage and the normal group of BMI above the average (LOHMAN, 1992).

TABLE 1 - Physiological, anthropometric and body composition characteristics by the BMI classifications in women

DEPENDENT VARIABLES	NORMAL	OVERWEIGHT	OBESE
N	93	94	49
Age (years)	46.7 ± 1.4	47.0 ± 1.4	46.8 ± 1.5
PA systolic (mmHg)	115.4 ± 13.1 [c]	118.8 ± 13.8 [c]	128.0 ± 22.4 [a, b]
PA diastolic (mmHg)	74.7 ± 9.4 [c]	76.9 ± 10.8 [c]	81.6 ± 14.1 [a, b]
Body mass (Kg)	56.8 ± 5.9 [b, c]	67.4 ± 6.5 [a, c]	78.5 ± 6.4 [a, b]
Body Height (cm)	157.3 ± 5.8	157.1 ± 6.3	156.5 ± 5.7
Waist perimeter (cm)	78.9 ± 5.1 [b, c]	88.3 ± 5.9 [a, c]	98.5 ± 6.8 [a, b]
? TR, SI and ABD skinfolds	64.2 ± 16.4 [b, c]	90.1 ± 25.9 [a, c]	111.6 ± 18.1 [a, b]
Fat percentage	27.4 ± 4.5 [b, c]	33.5 ± 3.7 [a, c]	38.2 ± 3.0 [a, b]
Fat mass (Kg)	15.7 ± 3.3 [b, c]	22.7 ± 3.8 [a, c]	30.0 ± 3.6 [a, b]
Lean body mass (Kg)	41.1 ± 4.5 [b, c]	44.7 ± 4.1 [a, c]	48.5 ± 4.4 [a, b]

[a] different of BMI normal ($p < 0.05$);
[b] different of BMI overweight ($p < 0.05$);
[c] different of BMI obese ($p < 0.05$);
PA = blood pressure;
TR = triceps skinfold;
SI = suprailiac skinfold;
ABD = abdominal skinfold.

There were significant correlations among BMI with fat percentage, waist perimeter and lean body mass; fat percentage with waist perimeter and lean body mass; and of waist perimeter with lean body mass. There were not significant correlations among age with BMI, fat percentage, waist perimeter and lean body mass. Hence; there were significant correlations among adiposity indexes (BMI, fat percentage and waist perimeter).

TABLE 2 - Pearson bivariate correlation among overweight and obesity indexes in women

VARIABLES	% FAT	PWAIST	LBM	AGE
BMI	0,76 *	0,86 *	0,61 *	0,01
% FAT		0,74 *	0,20 *	0,08
PWAIST			0,61 *	- 0,00
LBM				- 0,11

* $p < 0.05$

There is 80.0% of variance in the dependent variable BMI due to independent variables fat percentage, lean body mass and age (Table 3).

TABLE 3 - Analyses of multiple regression for BMI in women

INDEPENDENT VARIABLES	EQUATION
% FAT, LBM and AGE	-4,431 + (% FAT x 0,432) + (LBM x 0,345) + (AGE x 0,040); SEE = 1,67%

% FAT = fat percentage;
LBM = lean body mass;
AGE (years);
SEE = standard error of estimative.

DISCUSSION

The risk indexes for the emerging cardiovascular disease were regressively higher in obese, overweight and normal group of BMI. Resting systolic and diastolic blood pressure, waist perimeter, fat percentage, sum of skinfolds and fat mass were significantly differentiated among groups of BMI ($p<0.05$). Body mass and lean body mass were significantly differentiated among groups of BMI too.

The correlation between hydrostatic weighing and anthropometry is between 0.50 and 0.80 (NORTON and OLDS, 1996). There were significant correlations among adiposity indexes (BMI, fat percentage and waist perimeter) and of these indexes with lean body mass. The value met for the correlation between BMI and triceps skinfold in women aged between 40 and 50 years-old was 0.78 in studies of GARN, LEONARD and HAWTHORNE (1986) and in the present study it was 0.66. The correlation met between waist perimeter and BMI was 0.86 and of waist perimeter with fat percentage was 0.74. These results can justify the utilization of waist perimeter as risk factor index for development of diseases as hypertension, cardiovascular disease and type 2 diabetes (ACSM, 2005).

There is possibility of BMI in some studies, as to be limited to predict body fat percentage due to Its reflecting the quantity of fat, muscle mass and bone mass (LOHMAN, 1992). In the present study, the variance in BMI due to independent variable fat percentage, waist perimeter and lean body mass was significant, or do, 0.80. Due to It, it is possible to affirm that the BMI was not limited to predict fat percentage and It confirmed that BMI reflects relative mass of lean and fat tissue (GARN, LEONARD and HAWTHORNE, 1986).

CONCLUSION

The BMI predicted fat percentage in non-limited form in the studied population; BMI was sensible to detect significant variations among the comportments of the risk factors for the development of the cardiovascular disease studied and there were significant correlations among adiposity and overweight indexes.

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RELATION AMONG ADIPOSITY INDEXES IN WOMAN AGED BETWEEN 45 AND 49 YEARS-OLD

ABSTRACT

Objective: To analyze the relation between adiposity indexes in a female population. **Methods**: The sample was composed by 236 women aged between 45 and 49 years-old and they were visitors of the coast of Parana State. Body density was calculated by the predictive equation of JACKSON & POLLOCK (1978) with three skinfolds and fat percentage by the equation of SIRI (1961). BMI was classified by reference of WHO (1997) and waist perimeter with standardization suggested by HEYWARD and STOLARCZYK (1996). For data treatment descriptive statistic was used; *One-Way* Anova and the *post-hoc* of Tukey among BMI groups, Pearson bivariate *two-tailed* correlation among adiposity indexes, (p = 0.05); and multiple regression analisys with BMI as dependent variable and fat percentage, lean body mass and age as independent variables. **Results**: The higher it was the mean value of BMI, the higher were systolic and diastolic resting blood pressure, body mass, waist perimeter, ? of triceps, suprailiac and abdominal skinfolds, fat percentage, fat mass and lean body mass, and all these variables were differentiated among BMI groups (p<0,05). There were significant correlations among BMI, fat percentage and waist perimeter. The variance of the dependent variable BMI due to independent variables - fat percentage, lean body mass and age, was of 80.0%. **Conclusions**: The BMI predicted fat percentage in non-limited form in the studied population; BMI was sensible to detect significant variations among the comportments of the risk factors for the development of the cardiovascular disease studied and there were significant correlations among adiposity and overweight indexes. **Key-words**: Relations, adiposity indexes and women.

RELATION ENTRE DES INDICATEURS D´ADIPOSITÉ DANS DES FEMMES DANS L´ÂGE ENTRE 45 ET 49 ANNÉES

RÉSUMÉ

Objectif: analyser les relations existants entre les indices d´adiposité corporelle dans des femmes. Méthodes: ont été évalueés 236 femmes dans la bande étaire entre 45 et 49 années, habituées de la région litoralle de l´État du Paraná. La densité corporelle a été calculé par l´équation généralisée de JACKSON et POLLOCK (1985), trois pli cutanées et le pourcentage de graisse a été calculé par l´équation de SIRI (1961). L´IMC a été classifié conforme référentiel de WHO (1997) et le périmètre de la taille a été collecté par l´uniformisation suggérée HEYWARD et STOLARCZYK (1996). Pour le traitement des données s´est utilisé la statistique descriptive, One- Way Anova et le post-hoc de Tukey entre les groupes de IMC, corrélation linéaire de Pearson two-tailed entre les indices d´adiposité , les deux (p<0,05), et l´analyse de régression multiple en ayant comme variable dépendante l´IMC et indépendents le % graisse, masse corporelle maigre et l´âge. Résultats: plus élevé la valeur qui comprend le classement du IMC plus élevé a été la valeur de la PA systolique et diastolique de repos, masse corporelle, périmètre de la taille, ? pli cutanés triceps, supra-iliaca et abdominal, pourcentage de graisse, masse grosse et masse corporelle maigre en étant tous différenciés entre des groupes de IMC (p<0,05). Il y a eu corrélation significative entre IMC, % de graisse et périmètre de la taille. La variance dans la variable dépendant IMC dû les variables indépendants % graisse, masse corporelle maigre et âge a été de 80,0%. Conclusion: l´IMC, dans la population d´étude, prévoit de forme non limitée le pourcentage de graisse; a été sensible pour détecter des variations significatives dans les comportements des facteurs de risque pour le bourgeonnement des troubles cardiovasculaires étudiés et a aussi y eu la corrélation significative entre les indicateurs de poids excessif et obésité. **Mots-clé**: relation, indicateurs adiposité et femmes.

LA RELACIÓN ENTRE LOS INDICADORES DE ADIPOSO EN MUJERES EN LA EDAD ENTRE LOS 45 Y 49 AÑOS

RESUMEN

Objetivo: Para analizar las relaciones existentes entre los índices del adiposo corporal en mujeres. Métodos: habían evaluado a 236 mujeres entre las edades de los 45 y 49 años, frecuentadoras de la región litoral del estado del Paraná. La densidad corporal era calculada por la ecuación generalizada de JACKSON y de POLLOCK (1985), tres dobleces cutáneos y el porcentaje de la grasa eran calculados por la ecuación de SIRI (1961). El IMC fue clasificado como referencial del WHO (1997) y del perímetro de la cintura fueron recogidos por la estandardización sugerida HEYWARD y STOLARCZYK (1996). Para el tratamiento de los datos fue utilizado la estadística descriptiva, *One-Way Anova* y *post-hoc* de *Tukey* entre los grupos de IMC, correlación linear de Pearson *two-tailed* entre los índices del adiposo, ambos (p<0,05), y análisis de la regresión múltiple que tiene como dependiente cambiable el IMC e independiente del % de la grasa, masa corporal magra y edad.**Resultados:** Cuanto más elevado el valor que comprende la clasificación del IMC más elevado fue el valor de la PA sistólica y del diastólica de reposo, masa corporal, perímetro de la cintura, tríceps cutáneos de los dobleces del ?, supra-ilíaca y abdominal, porcentaje de la grasa, masa gorda y masa corporal magra, siendo todos diferenciados entre grupos de IMC (p<0,05). Hubo una correlación significativa entre IMC, % de la grasa y perímetro de la cintura. La variación en la variable dependiente IMC debido a las variables independientes % de la grasa, la masa corporal magra y la edad fue de 80.0%. **Conclusión:** EL IMC, en la población del estudio, predice de la forma no limitada el porcentaje de la grasa; fue sensible para detectar variaciones significativas en los comportamientos de los factores de riesgo para el surgimiento de disfunciones cardiovasculares estudiadas y también hubo una correlación significativa entre los indicadores del exceso de peso y de la obesidad. **Palabras-llaves:** Relación, indicadores de adiposidad y mujeres.

RELAÇÃO ENTRE INDICADORES DE ADIPOSIDADE EM MULHERES NA IDADE ENTRE 45 A 49 ANOS

RESUMO

Objetivo: Analisar as relações existentes entre os índices de adiposidade corporal em mulheres. **Métodos**: Foram avaliadas 236 mulheres na faixa etária entre 45 a 49 anos, freqüentadoras da região litorânea do Estado do Paraná. A densidade corporal foi calculada pela equação generalizada de JACKSON e POLLOCK (1985), três dobras cutâneas e o percentual de gordura foi calculado pela equação de SIRI (1961). O IMC foi classificado conforme referencial da WHO (1997) e o perímetro da cintura foi coletado pela padronização sugerida HEYWARD e STOLARCZYK (1996). Para o tratamento dos dados utilizou-se a estatística descritiva, *One-Way* Anova e o *post-hoc* de Tukey entre grupos de IMC, correlação linear de Pearson *two-tailed* entre índices de adiposidade, ambos (p<0,05), e análise de regressão múltipla tendo como variável dependente o IMC e independentes o % gordura, massa corporal magra e idade. **Resultados**: Quanto mais elevado o valor que compreende a classificação do IMC mais elevado foi o valor da PA sistólica e diastólica de repouso, massa corporal, perímetro da cintura, ? dobras cutâneas tríceps, supra-ilíaca e abdominal, percentual de gordura, massa gorda e massa corporal magra, sendo todos diferenciados entre grupos de IMC (p<0,05). Houve correlação significativa entre IMC, % gordura e perímetro da cintura. A variância na variável dependente IMC devido as variáveis independentes % gordura, massa corporal magra e idade foi de 80,0%. **Conclusão**: O IMC, na população de estudo, prediz de forma não limitada o percentual de gordura; foi sensível para detectar variações significativas nos comportamentos dos fatores de risco para o surgimento de distúrbios cardiovasculares estudados e também houve correlação significativa entre os indicadores de sobrepeso e obesidade. **Palavras-chave**: Relação, indicadores adiposidade e mulheres.