196 - RELATIONSHIP AMONG ADIPOSITY INDEXES IN WOMAN AGED BETWEEN 30 AND 34 YEARS OLD

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INTRODUCTION

According to American College of Sports Medicine - ACSM (2001), and important and easy-to-apply index to assess and classify population studies related to adiposity and obesity indexes is the Body Mass Index, known as BMI.

The waist circumference and skinfolds measurements can also be used as health risk indexes for the development of pathologies as type 2 diabetes, hypertension and cardiovascular disease (ACSM, 2003). Waist circumference index classifies people with the risk for the development of such pathologies, while skinfolds measurements may better estimate body composition, even being a little bit harder to be applied.

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 aim of this study was to examine the relationship between adiposity indexes in women aged between 30 and 34 years old.

METHODOLOGIC PROCEDURES

Population and sample

The sample was composed by 297 women aged between 30 and 34 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, millimeters.

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 recommendations 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 analyzed were body mass index, fat percentage, waist perimeter, lean body mass and age ($p < 0.05$).

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

RESULTS

Table 1 shows that the higher the classification of BMI was, the higher the average values of resting systolic blood pressure, body mass, waist perimeter, ? of triceps, abdominal and suprailiac skinfolds, fat percentage, fat mass and lean body mass were.

The obese group of BMI presented the closest classification for prehypertension by resting systolic and diastolic blood pressure, and the normal and overweight groups 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 groups 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	184	82	31
Age (years)	32,1 ± 1,3	32,2 ± 1,2	32,0 ± 1,4
PA systolic (mmHg)	109,8 ± 8,7 [c]	111,1 ±9,2	114,5 ± 9,9 [a]
PA diastolic (mmHg)	70,9 ± 6,9 [c]	70,4 ± 7,6 [c]	75,1 ± 8,2 [a, b]
Body mass (Kg)	57,2 ± 5,9 [b, c]	68,2 ± 5,5 [a, c]	80,1 ± 7,3 [a, b]
Body Height (cm)	159,8 ± 6,1	158,8 ± 5,8	158,0 5,4
Waist perimeter (cm)	77,2 ± 6,3 [b, c]	86,7 ± 4,6 [a, c]	98,1 ± 6,6 [a, b]
? TR, SI and ABD skinfolds	61,5 ± 17,0 [b, c]	84,5 ± 17,6 [a, c]	106,2 ± 16,0 [a, b]
Fat percentage	26,0 ± 4,8 [b, c]	31,9 ± 4,1 [a, c]	36,6 ± 3,1 [a, b]
Fat mass (Kg)	15,0 ± 3,7 [b, c]	21,8 ± 3,6 [a, c]	29,4 ± 4,1 [a, b]
Lean body mass (Kg)	42,1 ± 3,7 [b, c]	46,3 ± 4,2 [a, c]	50,6 ± 4,5 [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.

We can clearly observe that, by the fact BMI is an obesity index, all variables related to weight or body mass indexes presented significant differences between groups.

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).

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

VARIABLES	% FAT	PWAIST	LBM	AGE
BMI	0,75 *	0,84 *	0,63 *	0,00
% FAT		0,74 *	0,22 *	0,05
PWAIST			0,61 *	0,02
LBM				0,02

* $p < 0.05$

DISCUSSION

Higher values on risk indexes for cardiovascular diseases were found in obese BMI group. Values found for overweight BMI group were higher than in normal BMI group, but those were lower than in obese BMI group. Important results presented significant differences among the three groups, such as resting systolic blood pressure, waist perimeter, fat percentage, sum of skinfolds and fat mass were significantly differentiated among groups of BMI ($p<0.05$), confirming these indexes as important indexes for the tendency of obesity related diseases development.

BMI is easy to be applied and because of this it's widely used in clinical and epidemiological studies, demanding only data related to body mass (Kg) and height (m). There is the possibility of BMI to be limited to predict body fat percentage in some studies due to an influence of the fat quantity, 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, above 0.80. Because of 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).

Anthropometric indexes of overweight and obesity (BMI, fat percentage, waist perimeter) were statistically correlated, as well as significant correlations were found for these indexes with lean body mass. The correlation between hydrostatic weighing and anthropometry is between 0.50 and 0.80 (NORTON and OLDS, 1996). Skinfolds method presented a correlation between 0.70 and 0.90 with hydrostatic weighing (ACSM, 2003). A correlation of 0.70 between BMI and densitometry was found for men aged between 18 and 32 years old (SMALLEY, KNERR, KENDRICK, COLLIVER e OWEN, 1990).

There were significant correlations among adiposity indexes (BMI, fat percentage and waist perimeter) and of these indexes with lean body mass. The correlation met between waist perimeter and BMI was 0.84 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).

CONCLUSION

BMI was shown to be sensible to detect significant variations on risk factors behavior which may develop cardiovascular diseases in the studied population. High significant correlation was found also between overweight and adiposity indexes.

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RELATIONSHIP AMONG ADIPOSITY INDEXES IN WOMAN AGED BETWEEN 30 AND 34 YEARS OLD

ABSTRACT

Objective: To analyze the relationship between adiposity indexes in a female population. **Methods**: The sample was composed by 297 women aged between 30 and 34 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 the average value of BMI was, the higher systolic resting blood pressure, body mass, waist perimeter, ? of triceps, suprailiac and abdominal skinfolds, fat percentage, fat mass and lean body mass were, and all these variables were different among BMI groups (p<0,05). There were also significant correlations among BMI, fat percentage and waist perimeter. **Conclusions**: BMI was shown to be sensible to detect significant variations on risk factors behavior which may develop cardiovascular diseases in the studied population. High significant correlation was found also between overweight and adiposity indexes.

Key-words: Indexes; adiposity; women.

RELATION ENTRE DES INDICATEURS D´ADIPOSITÉ DANS DES FEMMES DANS L´ÂGE ENTRE 30 ET 34 ANNÉES

RÉSUMÉ

Objectif: analyser les relations existants entre les indices d´adiposité corporelle dans des femmes. Méthodes: ont été évalueés 297 femmes dans la bande étaire entre 30 et 34 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 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. 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: indicateurs ; adiposité ; femmes.

LA RELACIÓN ENTRE LOS INDICADORES DE ADIPOSO EN MUJERES EN LA EDAD ENTRE LOS 30 Y 34 AÑOS

RESUMEN

Objetivo: Para analizar las relaciones existentes entre los índices del adiposo corporal en mujeres. Métodos: habían evaluado a 297 mujeres entre las edades de los 30 y 34 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 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. **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: indicadores; adiposidad; mujeres.

RELAÇÃO ENTRE INDICADORES DE ADIPOSIDADE EM MULHERES NA IDADE ENTRE 30 A 34 ANOS

RESUMO

Objetivo: Analisar as relações existentes entre os índices de adiposidade corporal em mulheres na faixa etária entre 30 a 34 anos de idade.

Métodos: Foram avaliadas 297 mulheres na faixa etária entre 30 a 34 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 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. **Conclusão**: O IMC na população estudada demonstrou ser 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: Indicadores; adiposidade; mulheres.