15 - BODY FAT PROFILE AND METABOLIC DISORDERS BETWEEN MILITARIES OF II CENTER OF AIR DEFENSE AND CONTROL OF AIR TRAFFIC CINDACTA II

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INTRODUCTION

It is a fact that excessive quantities of fat in the human body can threaten the human health, being directly responsible for a large number of cardiovascular diseases, hypertension, diabetes and cancer, to name but a few (KATZMARZYK, 2005; RAHMOUNI,2005; ROBINSON, 2005; St-Pierre, 2005).

Due to this fact, an effective, fast and inexpensive method of detecting and fighting the prevalence of overweight, obesity and metabolic alteration risks has been established the Body Mass Index (BMI) as it is more commonly referred to. The American College of Sports Medicine (2006) makes use of this system and warns that high scores in the height/weight relation in human beings is undoubtedly connected to the occurrence and development of heart diseases.

The overall distribution of fat in the human body is one of the aspects of adiposity that has been drawing the attention of the medical world in recent years. Vague (1956) has developed a male differentiation index that classified body fat in android fat and gynoid fat. Android fat is the name given to the fat found in male individuals, mostly in the abdominal area, while gynoid fat is the name given to the fat which is commonly found in female individuals, concentrated in the hips and thigh areas. Years later, Larsson et al., (1984) discovered connections between the ratio wait-to-hip circumference and the occurrence of heart attacks, strokes and even premature death cases.

The topography of the body fat has appealed to the attention of the medical society worldwide. Doctors specialized in obesity and overweight cases have been studying it and found out a large number of metabolic complications associated with the abdominal fat, as well as with the fat which can be found in the upper areas of the human body, such as coronaryan diseases risk, glucose intolerance, diabetes, hypertension and others (SIRONI, 2004; BECKLEY, 2005; POIRIER, 2005).

This study aims at verifying the profile of the body fat found in militaries of both sexes, and the risks of metabolic alterations.

Materials and Procedures

An experimental research was conducted between militaries members of II Center of air defense and control of air traffic CINDACTA II located in the city of Curitiba, PR, Brazil.

All of the effective, both male and female, performing work activities at the base were requested for the research. 835 militaries, 784 male individuals and 51 female ones, went through the whole procedure. This number consists of 79, 9% of the effective presently working in the institution. Unfortunately, 210 members of the effective were unable to complete the whole procedures for the research, due to a number of no pertinent external reasons.

Measurements of the waist and hips were taken according to the standards set by Callaway (1988), using a Seca© brand anthropometric measuring tape. The standards set by the American College of Sports Medicine (2006), were used to determine the risks of metabolic diseases in the individuals tested through the waist circumference (WC) and Body Mass Index (BMI).

The profile of body fat distribution was analyzed based on the ratio wait-to-hip circumference (WHR), (LARSSON, 1984).

The measurements of body mass and stature were obtained in a Welmy© brand mechanic scale, ranging 0 to 150, 00 kg, and its stadiometer was used to measure the individuals' stature, following procedures first described by Gordor, Chumlea and Roche (1988).

A "t" test, significance level $p<0,05$, was used to compare all the possible variants in this study.

RESULTS AND DISCUSSION

The anthropometric and characteristics of the 835 militaries of CINDACTA II (30, 82 $\pm$ 8, 82 years old; 69,87 kg $\pm$ 10,87 kg 170,56 cm $\pm$ 6,04 cm) can be read, in **Table 1**.

Table 1. Average scores, standard deviation and t test of the variants analyzed in this study.

	Men (784)	Women (51)	t test
Age (years)	29,51 ÿ 8,88	32, 14 ÿ 8, 76	0,044385*
Body Mass (Kg)	76,38 ÿ 11,11	63, 37 ÿ 10,64	1,71E-11*
Stature (cm)	175,88 ÿ 6,36	165,20 ÿ 5,73	2,1E-18*
WC	83,92 ÿ 8,88	74,66 ÿ 9,67	1,7E-08*
BMI	24,67 ÿ 3,2	23,34 ÿ 4,46	0,041942*
WHR	0,86 ÿ 0,07	0,76 ÿ 0,07	0,501378

Statiscally significant results (P<0,05); WC = Waist Circumference; BMI = Body Mass Index expressed in kg/mÿ; WHR = Ratio Waist-To-Hip Circumference.

The resulting BMI scores, 24, 64 Kg/m² in men and 23,3 kg/m² in women, are perfectly acceptable, considering that a result, to be considered healthy, usually ranges 18,5 to 24,9 kg/m². The individuals tested present, in a general way, normal scores in the height/weight relation (AMERICAN COLLEGE OF SPORTS MEDICINE, 2006). Analyzing the results sample in the research and comparing them to the BMI classifications and its implications in health, it was possible to state that 56,63 % of the male individuals tested and 74,5 % of the female ones are within the health standards endorsed by the American College of Sports Medicine (2006). 37, 73 % of the male individuals tested, and 13, 72 % of the female, are overweight, which means that they are vulnerable to obesity and overweight related problems. 5,38 of the man and 11,76 % of de woman are prone to developed diseases, such as diabetes, hypertension and different kinds of coronariophaty.

However, in recent studies, the prevalence of cardiovascular diseases has been blamed, in part, on inactive populations and/or overweight ones, and has also been found out that body fat excess better predicts cardiovascular risks than the aerobic conditioning of men (CHRISTOU, 2005).

As far as abdominal fat and vulnerability to diseases are concerned, the waist circumference related to a minor number of occurrences of metabolic diseases is below 102 cm for men and 88 cm for women (AMERICAN COLLEGE OF SPORTS MEDICINE, 2006). The average waist measurement score achieved in this research was 83,92 cm in the men and

74,66 cm in the women presently performing activities at the base, and this data is an irrefutable proof of the statistically significant differences regarding the waist circumference that stands between individuals of the opposite sexes, meaning they are under little danger of developing metabolic alterations, diseases and complications. 97, 44% of the male individuals and 88, 23% of the female individuals subject to the same procedures do not tend to develop abdominal fat-related diseases. Even considering this to be a rather small number, 2, 56 % of the male and 11, 77% of the female individuals are in great danger of developing diseases related to the presence of excessive abdominal fat, and that is a ratio to be considered.

Freedman et al. (1990) strongly claim that abdominal fat cells are characterized by relatively high lipolysis (the breakdown of fat stored in fat cells), causing the grax acids present in the body and inter-abdominal adiposities to de drained into the portal circulation and carried in to the liver, exposing the liver to high lipid concentrations and that is dominant aspect of the body fat topography.

Due to sexual differences, male individuals possess higher quantities of surface body fat in the abdominal area while female individuals tend to present higher concentrations of body fat in the hip and thigh area (KUK, 2005). It is so due to the fact that the presence of excessive visceral fat, in both sexes, is associated with the increase of cortisol and the decrease of sexual hormones secretion, in men and women (BJÖRNTORP 1991a, 1991b).

According to the same author, the testosterone found in the human body can increase the effects on lipolysis, in opposition to the cortisol, partially blocking the work of lipase lipoprotein concentrated in the abdominal area, but the metabolic characteristics of the excessive fat in the hip and thigh area in women seem to be increased in face of the lipoprotein and slower lipolysis activity. The relative protection against the triglycerides accumulation in the visceral fat of women is possibly affected by the presence of the progesterone in the female body, protecting the visceral adiposity against the effects of the cortisol in the lipoprotein lipase stimulation.

As for the distribution of body fat in men and women, in the other words, the WHR, the results achieved equal 0,86 and 0,76 for male and female sexes respectively, considering that the acceptable scores are 0,95 for men and 0,80 for women (LARSSON et al., 1984).

Concerning the increase of metabolic risks, 80, 35% of the men and 74, 74% of the women subject to the research were stated as out-of-risk individuals. However, 19, 64% and 23, 52% of the militaries tested, men and women respectively, tend to present cardiovascular complications due to their extensive abdominal diameter (KOHRT et al., 1992, TANNE, 2005).

CONCLUSION

It has been concluded that the militaries, in a general way, present normal BMI, WC and WHR relations, meaning they do no tend, mostly, to develop metabolic disorders. Statistically significant differences were noticed among men and women. It has been so due to the fact that the men tested present higher concentrations of abdominal fat than women and that is a decisive factor when measuring WHR scores.

REFERENCES

AMERICAN COLLEGE OF SPORTS MEDICINE. **Guidelines for exercise testing and prescription**. 7th ed. Philadelphia: Lippincott Williams & Wilkins, 2006.

BECKLEY, E. T. Waist size stronger cardiovascular risk predictor than body mass. **DOC news**.; v. 2 p. 6, 2005.

BJÖRNTORP, Metabolic implications of body fat distributions. **Diabetes Care**, v. 14, n. 12, p. 1132-1142, 1991a.

. Adipose tissue distribuition and function. **International Journal of Obesity.** v.15, p. 67-81, 1991b.

CALLAWAY, C.W. et al. Circumferences. In: Lohman TG, Roche AF, Martorell. R. (Eds.). **Anthropometric standardization reference manual.**; Champaign: Human Kinetics, 1988.

CHRISTOU, D.D. et al., Fatness Is a Better Predictor of Cardiovascular Disease Risk Factor Profile than Aerobic Fitness in Healthy Men. **Circulation.** v. 111 p. 1904-1914, 2005.

FREEDMAN, D. S. et al. Body fat distribution and male/female differences in lipids and lipoproteins. **Circulation**, v. 81, p. 1498-1506, 1990.

GORDON, C.C., CHUMLEA W.C., ROCHE, A. F. Stature, recumbent length, and weight. In: LOHMAN T.G., ROCHE A.F., MARTORELL, R. (Eds.). **Anthropometric standardization reference manual.**; Champaign: Human Kinetics, 1988.

KATZMARZYK, P.T., et al. Metabolic Syndrome, obesity, and mortality. **Diabetes Care.**; v. 28 p. 391-397, 2005.

KOHRT, W.M. et al. Body composition of healthy sedentary and trained, young and older men women. **Medicine and Science in Sports and Exercice**, v.24, n.7, p. 832-837, 1992.

KUK, J. L., LEE, S., HEYMSFIELD, S. B., ROSS, R. Waist circumference and abdominal adipose tissue distribution: influence of age and sex. **American Journal of Clinical Nutrition.** v.81 n.6 p. 1330 1334, 2005.

LARSON, B. et al. Abdominal adipose tissue distribution, obesity, and risk of cardiovascular disease and death: 13 year follow up of participants in the study of man born in 1913. **British Medical Journal**, v. 288, p. 1401-1404, 1984.

POIRIER, P. Impact of waist circumference on the relationship between blood pressure and insulin. **Hypertension**. 2005;45:363-367.

*RAHMOUNI K, CORREIA M.L.G., HAYNES W.G., MARK A.L. **Obesity**-Associated* Hypertension. Hypertension.; *v. 45, p. 9-14. 2005.*

ROBINSON, W. R., STEVENS, J., GAMMON M. D., JOHN, E. M. Obesity before Age 30 Years and Risk of Advanced Prostate Cancer. **Am. J. Epidemiol.**; v.161, p. 1107-1114,2005.

SIRONI, A. M. GASTALDELLI, A., MARI, A. et. al. Visceral Fat in Hypertension: Influence on Insulin Resistance and â-Cell Function **Hypertension**. V. 44, p. 127-133, 2004.

ST-PIERRE, A.C., et al. Insulin resistance syndrome, body mass index and the risk of ischemic heart disease. **Can Med Assoc J.** v. 172, p. 1301 - 1305. 2005.

TANNE, D., MEDALIE, H J., GOLDBOURT, U. Body Fat Distribution and Long-Term Risk of Stroke Mortality. **Stroke.**; v.36 p. 1021-1025, 2005.

VAGUE, J. C. et al. The degree of masculine differentiation of obesities: A factor determining predisposition to diabetes, atherosclerosis, gout, and uric calculous disease. **The American Journal of Clinical Nutrition**, v.4, n.1, p.20-34, 1956.

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BODY FAT PROFILE AND METABOLIC DISORDERS BETWEEN MILITARIES OF II CENTER OF AIR DEFENSE AND CONTROL OF AIR TRAFFIC CINDACTA II (CURITIBA-PR)

ABSTRACT

This study intended to verify the profile of the human body fat in adult militaries of both sexes and the risks of metabolic alterations. The Body Mass Index (BMI), Waist Circumference (WC) and the Ratio Waist-to-Hip (WHR) were checked in 835 members of the military base (AMERICAN COLLEGE OF SPORTS MEDICINE, 2006, LARSSON, 1984). In a general way the militaries subject to the research presented normal BMI, WC and WHR relations, which means they are have little tendencies at all to develop diseases associated to metabolic disorders. Statistically significant differences were noticed between men and women. It has been so due to the fact that the men tested present higher concentrations of abdominal fat, and that is a decisive factor when measuring WHR scores.

Key Words: body fat profile, health, metabolic alterations.

PROFIL DE LA GRASSE CORPORALE ET CHANGEMENTS MÉTABOLIQUES PARMI DES MILITAIRES DU II CENTRE DE LA DÉFENSE ET TRAFIQUENT AÉRIENS - CINDACTA II

RÉSUMÉE

L'objectif de cette étude était de vérifier le profil de la masse grasse corporelle parmi des militaires adultes des deux sexes, ainsi que le risque de changements métaboliques. On a pu vérifier l'Indice de Masse Corporelle (IMC), la mesure du Tour de Taille et la Proportion Tour de Taille/Hanche en 835 militaires des sexes masculin et féminin (AMERICAN COLLEGE OF SPORTS MEDICINE, 2006 ; LARSSON et al., 1984). D'une manière générale les militaires ont présenté un niveau normal de relation entre l'IMC, le Tour de Taille et la Proportion Tour de Taille/Hanche, ce qui a donné des risques réduits par rapport aux problèmes de santé relationnés aux désordres métaboliques chez les militaires. On a rencontré des différences statistiquement significatives dans le Tour de taille parmi les hommes et les femmes. Pour cela, on a conclu que les militaires du sexe masculin ont présenté une plus grande quantité de graisse localisée dans la région de l'abdomen que les femmes. Ça qui détermine les plus grandes valeurs entre la Proportion Tour de Taille/Hanche chez le sexe masculin.

Mots-clés : profil de la grasse corporelle, santé, changements métaboliques.

PERFIL DE LA GRASA CORPORAL Y ALTERACIONES METABÓLICAS ENTRE MILITARES DE LO II CENTRO DE DEFENSA AéRÉA Y TRÁFICO AéRÉO CINDACTA II

RESUMEN

El objectivo deste estudio fue de verificar el perfil de la grasa corporal entre militares adultos de ambos los sexos, como también, el risco de alteraciones metabólicas. Verificou-se el Índice de Massa corporal (IMC), Circunferencia de la Cintura (CC) y la Proporción Circunferencia Cintura cuadril (PCCQ) en 835 militares del sexo masculino y feminino (AMERICAN COLLEGE OF SPORTS MEDICINE, 2006; LARSSON et al., 1984). De una forma general los militares presentaran un padrón normal de las relaciones entre el IMC, CC y PCCQ, el que conferiu riscos reduzidos cuando à problemas de salud relacionados à desordens metabólicas en los militares. Fueron encuentradas diferencias estatisticamente significativas em la CC entre hombres y mujeres. Para tanto, concluiu-se que los militares del sexo masculino presentaron mayores cuantidades de grasa localizadas en la región abdominal do que las mujeres, el que determina mayores valores entre la PCCQ en el sexo masculino.

Palabras-llave: perfil de la grasa corporal, salud, alteraciones metabólicas.

PERFIL DA GORDURA CORPORAL E ALTERAçõES METABóLICAS ENTRE MILITARES DO II CENTRO DE DEFESA AéREA E TRAFICO AéREO CINDACTA II

RESUMO

O objetivo deste estudo foi de verificar o perfil da gordura corporal entre militares adultos de ambos os sexos, como também, o risco de alterações metabólicas. Verificou-se o Índice de Massa corpórea (IMC), Circunferência da Cintura (CC) e a Proporção Circunferência Cintura Quadri (PCCQ) em 835 militares do sexo masculino e feminino (AMERICAN COLLEGE OF SPORTS MEDICINE, 2006; LARSSON et al., 1984). De uma forma geral os militares apresentaram um padrão normal das relações entre o IMC, CC e PCCQ, o que conferiu riscos reduzidos quando à problemas de saúde relacionados à desordens metabólicas nos militares. Foram encontradas diferenças estatisticamente significativas na CC entre homens e mulheres. Para tanto, concluiu-se que os militares do sexo masculino apresentaram maiores quantidades de gordura localizadas na região abdominal do que as mulheres, o que determina maiores valores entre a PCCQ no sexo masculino.

Palavras-Chave: perfil da gordura corporal, saúde, alterações metabólicas.