05 - CORRELATION BETWEEN NECK CIRCUMFERENCE WITH BODY COMPOSITION AND BIOMARKERS IN NURSING PROFESSIONALS

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INTRODUCTION

Kinanthropometry is defined as the study of human size, shape, proportion, composition, maturation and gross function, leading to understanding growth, exercise, performance, and nutrition. (BOHM, 2000.)

The body composition evaluation reports on the behavior of indicators associated with physical growth, and intervention of weight control programs through diet and exercise prescriptions (MORAN; GARCIA; ZAMORANO, 2011).

Biomarkers such as fibrinogen, C-reactive protein, serum amyloid A protein, cytokines and levels of certain white blood cells are being studied in patients with unstable angina, acute myocardial infarction, ischemic cerebrovascular disease, peripheral arterial disease and healthy individuals for preventing future injuries (SANTOS et al., 2003).

Homocysteine is asulfur-containing amino acid, which is formed from the essential amino acid, methionine. Hyperhomocysteine is prevalent in 40% of patients with coronary artery, cerebral arterial and peripheral arterial diseases, however, prevalent in only 15% of healthy subjects (GUERZONI et al., 2009)

Studies show that high levels of fibrinogen increase the risk of coronary heart disease by increasing plasma viscosity, platelet aggregation and volume of fibrin deposits (KAMATH, LIP, 2003).

C-reactive protein, when used as a marker in inflammatory or infectious processes, is regarded as the reference boundary when used to assess the risk of atherosclerotic diseases, up to 0.11 mg/dL. Its production also occurs in atherosclerotic lesions, macrophages, kidney, neurons, smooth muscle cells, adipose tissue and pulmonary alveoli (RIDKER, 2001).

Thus, this study aims to determine the correlation between neck circumference, and the inflammatory markers homocysteine, fibrinogen and C-reactive protein of nursing professionals as well as correlate the circumference with metabolic and anthropometric variables of the sample.

METHODOLOGY

This study was a quantitative research with cross-sectional data collection. It was conducted atHospital UniversitárioJoão de Barros Barreto(HUJBB) in the city of Belém-PA, from May 30 to December 2011, with a sample of 58 nursing professionals (NP), female, aged between 18-69 years old, who were current employees, hired under employment laws or contract of HUJBB.

Requirements to participate in the study were: João de Barros Barreto's College Hospital staff, aged between 18-69 years old; signing the informed consent form (ICF). The exclusion criteria for the sample were: diagnosed cardiological pathology, pregnant women, any medication intake that interferes with the fat levels, inflammatory markers, or blood cells, such as beta-blockers, immunosuppressants, statins, fibrates and contraceptives; pathology in the thyroid gland or not fit in any of the research inclusion criteria.

The subjects were invited to attend the Laboratory for the Study of Nutritional Pathology, Center of Pathology of HUJBB where to take the survey they had to read and sign the informed consent form (ICF), after consent, the professionals responded to a questionnaire containing a brief medical history.

It was carried out the measurement of blood pressure (BP) of the subjects with an Aneroidsphygmomanometer Premium®, using this measurement techniques described according to the VI DiretrizesBrasileiras de Hipertensão (2010).

Once BP measurement done, the subjects were undergone an anthropometric measurement, using light clothing, which one was made through weight and height measurement, using a mechanical scale with a 100g precision Welmy® 104ch (300 kg), and following the Ministry of Health standards for such evaluation (BRAZIL, 2004).

For the circumferences' measurement, it was used a Sanny® precision mm-1 metal anthropometric tape, to measure the circumference of the waist, abdomen, hip, wrist and neck. A Cescorf® precision mm-1 caliper was used for measuring the radio–ulnar biestiloid diameter and femoral biepicondilian.

The data collected during the interview and anthropometric measurements were organized and tabulated in software created in Microsoft® Office Excel 2007 spreadsheets, specifically for the research. It was used the protocol of Penroe, Nelsonand Fisher and Matiegka's basic equation respectively, using anthropometric measurements above mentioned (FERNANDES FILHO, 2003).

After anthropometric assessment was scheduled laboratory examination of the assessed one; it was collected blood samples of nursing professionals in the Clinical Pathology Laboratory of HUJBB, for blood count measurement, with the use of a Cell-Dyn 3700 hematology automated analyzer for evaluation of number of erythrocytes, hemoglobin, hematocrit, white blood cells and platelets, In which the normal range for both young adults and for older adults are 4.5 to 5.5 million/l, 11-18 g/dl in females (F) and 13-20 g/dL in males (M) , 35-45% in F and 36-52% in M, 4.5-11/mm³ and 150-450 mil/mm³, respectively (ANDRIOLO; MENDES, 2009).

It was gauged by assessment of blood glucose, where the normality pattern of the fasting subject range is from 70 to 100 mg/dL. We also investigated the levels of total cholesterol, triglycerides, HDL and LDL cholesterol, wherein their expected levels are less than 200 mg/dL and below 150 mg/dL greater than 40 mg/dL and below 100 mg/dL, respectively (MOLINA, 2004).

We evaluated the inflammatory markers ultra-sensitive C-reactive protein, through turbidimetric testing; homocysteine by microparticle enzyme immunoassay or MEIA, and fibrinogen in AMAX 190 automated coagulation analyzer coagulometer, using Glaussian elimination, having these markers levels to normal up to 0.5 mg/dL, desirable below 10mM/L, between 200 to 400 mg/dL, respectively (ANDRIOLO; MENDES, 2009).

After all sample data collection, we performed the statistical analysis of the variables using Bioestat 5.0 software for the detection of the descriptive statistics and the corresponding percentage, formulation of grouping tables and scatter plots, containing arithmetic mean ($\bar{x}$), percentages (%), standard deviations (s), confidence intervals (95% CI) and matched tests to obtain the Pearson's r (r).

This study was approved by the Research Ethics Committee of Hospital UniversitárioJoão de Barros Barreto(HUJBB), at the meeting on December 2nd, 2010, under the term nº 2417/10.

RESULTS AND DISCUSSION

Table 1 presents data on the physical evaluation of nursing professional and mean arterial pressures of NP.

Table 1. Nutrition Evaluation and blood pressure of nursing professionals, HUJBB, 2011.

Data	$\bar{X}$ ± s	CI 95%	Classification
Age (years old)	42 ± 9	(39,7 - 43,9)	
Weight (kg)	65,4 ± 11,4	(62,5 - 67,9)	
Height (m)	1,57 ± 0,06	(1,55 - 1,58)	
BMI (kg/m²)	26,56 ± 4,37	(25,4- 27,5)	Overweight
WC (cm)	81,3 ± 8,93	(79,1 - 83,2)	Increased
NC(cm)	33,2 ± 2,61	(32,6 - 33,8)	
WHR	0,8 ± 0,06	(0,78 - 0,81)	Acceptable
%G	35 ± 6,81	(33,2 - 36,3)	Overweight
FM (kg)	23,5 ± 8,85	(21,3 - 25,35)	
%MM	31,3 ± 6,39	(29,7 - 32,7)	Underweight
MMg (kg)	41,91 ± 3,83	(40,9 -42,7)	
SBP (mmHg)	118,27± 11,1	(115,4 - 120,6)	Normal
DBP (mmHg)	74,4± 11,17	(71,4 - 76,8)	Normal

The Household Budget Survey (HBS) conducted in 2008 and 2009 showed that 48% of Brazilian women were overweight, among them, 16.9% were obese (IBGE, 2011). In the present study, most nurses (NP) ofHospital UniversitárioJoão de Barros Barreto (HUJBB) were overweight, evaluated by their Body Mass Index (BMI), of which one-fifth had degrees of obesity therefore greater numbers than those found in Brazilian women.

Another study, which aimed to analyze a linking between obesity and blood pressure levels between NP of a philanthropic institution, conducted with a sample of 147 individuals, of which 135 were women (91.8%). It was identified in this study that 58.5% of women had a waist-hip ratio (WHR) < 0.85 and 56 (41.5%) had WHR ≥ 0.85, and 6% were with SBP ≥ 140 mmHg and 6.6% had DBP > 90 mmHg (OLIVEIRA; NOGUEIRA, 2010). Collected data from the NP sample of HUJBB showed WHR's arithmetic mean and levels of systolic (SBP) and diastolic (DBP) blood pressure were within normal limits.

Table 2 shows the total cholesterol arithmetic mean, LDL and glucose levels of NP, which are above those recommended.

Table 2. Metabolic evaluation of nursing professionals, HUJBB, 2013.

Data (mg/dL)	$\bar{X}$ ± s	CI 95%	Classification
Total Cholesterol	202,5 ± 46,5	(191,2 - 212,8)	High
LDL	121,6 ± 42,4	(111,3 - 130,7)	High
HDL	58,7 ± 12,1	(55,7 - 61,3)	Acceptable
Triglycerides	113,1 ± 63,4	(97,4 - 126,9)	Normal
Glucose	106,1 ± 41,3	(99,3 - 116,45)	High

A descriptive, observational and cross-sectional study performed in a hospital, aimed to identify the occurrence of Diabetes Mellitus (DM) among nursing staff. This study had a sample of 418 nurses, of whom 85.9% were female; We observed that all risk factors for DM were present among nursing staff, overweight (45.3%), abdominal obesity (32.9%) and age range greater than 45 years old (31.5%). In this sample, the occurrence of DM represented 3.1% (TAVARES et al. 2010). In this research, we observed a higher prevalence of hyperglycemic as well as greater degrees of abdominal obesity.

Table 3 displays the average levels of inflammatory markers of NP, where the average for ultra-sensitive C-reactive protein (us-CRP) was higher than recommended for assessing the risk of atherosclerotic diseases.

Table 3. Data on inflammatory markers of nursing professionals, HUJBB, 2011.

Data (mg/dL)	$\bar{X}$ ± s	CI 95%	Classification
us-CPR	0,42 ± 0,59	(0,27 - 0,56)	High
Fibrinogen	225,8 ± 98,7	(201,1 - 247,4)	Normal
Homocysteine	8,79 ± 1,78	(8,3 - 9,1)	Normal
Leucócitos	6.391 ± 2262	(5559 - 7081)	Normal

Inflammation plays a key role in the development of insulin resistance and diabetes mellitus type 2, initiation and progression on atherosclerotic lesions, as well as ruptures of plaques.

Interleukin-6 and tumor necrosis factor (TNF-α) are inflammatory cytokines, and major inducers of secretion of CRP by the liver. Recent studies suggest that CRP has a role in the pathogenesis of atherosclerotic lesions in humans (LIBBY, 2002).

Table 4 shows the correlation between neck circumference (NC) with some variables collected the sample, which ones showed strong correlations with CP as the body mass index (BMI), waist circumference (WC), body fat percentage (%BF) and fat mass (FM).

Table 4. Correlations between Neck Circumference (NC), Nursing Professionals and some attributes, HUJBB, 2011.

Attributes	r	P
BMI	0,78	<0,0001*
NC	0,83	<0,0001*
WHR	0,62	<0,0001*
%BF	0,71	<0,0001*
FM	0,78	<0,0001*
%MM	-0,62	<0,0001*
MMg	0,68	<0,0001*
SBP	0,23	0,07
DBP	0,15	0,25
Total Cholesterol	0,05	0,69
LDL	0,02	0,86
HDL	-0,14	0,27
Triglycerides	0,28	0,03
Glucose	-0,12	0,34
us-CRP	-0,01	0,92
Fibrinogen	-0,15	0,26
Homocysteine	0,03	0,78
Leukocytes	0,28	0,02

*Correlations with the level of significance. $p<0,05$

It was performed a survey to determine a relationship between neck circumference (NC) and risk factors for coronary heart disease by evaluating the components of metabolic syndrome.The study involved a sample of 561 patients, 231 men and

330 women, patients were not taking any medication. We performed the Pearson's r between the NC, the following variables: BMI (men, r=0.71; women, r=0.81, each p<0.0001), WC (men, r=0, 75; women, r=0.79, each p<0.0001), WHR (men, r=0.56; women, r=0.63, each p<0.0001), total cholesterol (men, r=0.50; women, r=0.66, each p<0.0001), LDL-c (men, r=0.42; women, r=0.60, each p<0, 0001), triglycerides (men, r=0.48; women, r=0.49, each p<0.0001), glucose (men, r=0.21, p<0.001; women, r=0,44, p<0.0001), uric acid (men, r=0.50, p<0.0001; women, r=0.60, p<0.001) and systolic blood pressure (men, r=0.53, women, r=0.69, each p<0.0001), and diastolic blood pressure (men, r=0.55; women, r=0.65, each p<0.0001). Therefore, the NC is highly correlated with metabolic syndrome variables (BEN-NOUN; LAOR, 2003).

The correlations between the NC of NP in this study with anthropometric variables already mentioned, were strong and significant, however, the metabolic variables (total cholesterol and fractions, glucose, triglycerides and others), were weak correlations and not statistically significant, unlike research above.

CONCLUSION

In the present study with nursing professionals of Hospital UniversitárioJoão de Barros Barreto(HUJBB), there was no significant linear correlation between inflammatory markers and neck circumference (NC). However, there were strong correlations, with great statistical significance between the NC and the body mass index (BMI), waist circumference (WC), percentage body fat (%BF) and fat mass (FM), as well as a strong negative linear correlation between the NC and muscle mass percentage (%MM).

It is concluded that the nursing professionals of HUJBB are potential patients to acquire cardiovascular problems, because most are overweight, corroborated by the BMI's anthropometric analysis, WC and %BF and confirmed by some blood tests outside reference ranges, as (us-CRP), glucose, total cholesterol and LDL.

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CORRELATION BETWEEN NECK CIRCUMFERENCE WITH BODY COMPOSITION AND BIOMARKERS IN NURSING PROFESSIONALS

ABSTRACT

Background: Biomarkers and body circumferences can predict future risks to the cardiovascular health of individuals. Goals: To determine the correlation between neck circumference, body composition and inflammatory markers homocysteine, fibrinogen and C-reactive protein in nursing professionals. Methods: The authors conducted a cross-sectional descriptive, which was attended by 58 female nurses, aged between 18-69 years old, from a public hospital in Belém-PA. Anthropometric variables were evaluated such as weight, height, circumferences, breadths and laboratory tests. Results: Pearson's Rs indicated no significant associations between neck circumference and C-reactive protein biomarkers (r= -0.01, P=0.92), fibrinogen (r= -0.15, P=0, 25) and homocysteine (r=0.03, P=0.78), however, there were strong and significant correlations between neck circumference and anthropometric variables such as body mass index (r=0.78, P<0, 0001), waist circumference (r=0.83, P<0.0001), body fat percentage (r=0.71, P<0.0001) and muscle mass percentage (r= -0.62 P<0.0001). Conclusion: There was no significant correlation between neck circumference, and inflammatory markers and metabolic variables of the professionals surveyed, however, there was a strong and significant correlation between neck circumference and anthropometric variables.

KEYWORDS:biomarkers, neck, body composition.

CORRESPONDANCE ENTRE LA CIRCONFÉRENCE AVEC LE COU ET LA COMPOSITION CORPORELLE DE BIOMARQUEURS PROFESSIONNELS DES SOINS INFIRMIERS

RÉSUMÉ

Fondement théorique: Les biomarqueurs et les circonférences corporelles peuvent prédire des risques pour la santé cardiovasculaire des individus. Objectif : déterminer la corrélation entre la circonférence du cou, la composition corporelle et les marqueurs inflammatoires homocystéine, fibriogène et protéine C réactive chez du personnel infirmier. Méthodologie : Une recherche descriptive trasnversale à laquelle ont participé 58 professionnels du sexe féminin ayant entre 18 et 69 ans, dans un hôpital public à Belém, dans l'État du Pará. On a évalué des variables antropométriques telles que le poids, la taille, les circonférences, les diamètres osseux et des analyses médicales. Résultats: les corrélations Linéaires de Pearson n'ont pas indiqué d'associations significatives entre la circonférence du cou et les biomarqueurs Protéine C Réactive (r=-0,01, P=0,92), Fibriogène (r=-0,15, P=0,25) et Homocystéine (r=0,03, P=0,78), cependant, des fortes et significatives corrélations ont été idenfiées entre la circonférence du cou et les variables antropométriques telles que l'indice de masse corporelle (r=0,78, P<0,0001), la circonférence de la ceinture (r=0,83, P<0,0001), le pourcentage de graisse corporelle (r=0,71, P<0,0001) et le pourcentage de masse musculaire corporelle (r=-0,62, P<0,0001). Conclusion: on a n'a pas constaté de corrélations significatives entre la circonférence du cou, les marqueurs inflammatoires et les variables métaboliques chez les professionnelles testées, toutefois une forte et significative corrélation entre la circonférence du cou et les variables antropométriques a pu être identifiée.

MOTS-CLÉS: biomarqueurs, cou, composition corporelle.

CORRELACIÓN ENTRE CIRCUNFERENCIA CONCUELLO Y COMPOSICIÓN CORPORAL DE BIOMARCADORES ENFERMERÍA PROFESIONAL

RESUMEN

Antecedentes: Biomarcadores y circunferenciascorporalespuedenpredecirlosriesgos futuros para lasalud cardiovascular de losindividuos. Objetivo: Determinar lacorrelación entre lacircunferenciadelcuello, a lacomposición corporal y los marcadores inflamatorioshomocisteína, fibrinógeno y la proteína C-reactiva de losprofesionales de enfermería. Metodología: Los autores realizaronunestudiodescriptivo, a la que asistieron 58 enfermeras, conun rango de edad de 18 a 69 años, de un hospital público en Belém-PA. Se evaluaronlasvariables antropométricas, como peso, talla, circunferencias, anchuras y laspruebas de laboratorio. Resultados: los coeficiente de correlación de Pearson indicaron que no huboasociaciones significativas entre lacircunferenciadelcuello y losbiomarcadores de proteína C-reactiva (r= -0,01, P=0,92), fibrinógeno (r= -0,15, p=0, 25) y lahomocisteína (r=0,03, P=0,78), sin embargo, hubo correlaciones fuertes y significativas entre lacircunferenciadelcuello y lasvariables antropométricas como el índice de masa corporal (r = 0,78, P <0, 0001), circunferencia de la cintura (r=0,83, P<0,0001), porcentaje de grasa corporal (r = 0,71, P <0,0001) y elporcentaje de masa muscular (r= -0,62 P<0,0001). Conclusión: No hubocorrelación significativa entre lacircunferenciadelcuello, y los marcadores inflamatorios y variables metabólicas de losprofesionalesencuestados, sin embargo, hubo una correlaciónfuerte y significativa entre lacircunferenciadelcuello y lasvariables antropométricas.

PALABRAS CLAVE: biomarcadores, elcuello, lacomposición corporal.

CORRELAÇÃO ENTRE A CIRCUNFERÊNCIA DO PESCOÇO COM A COMPOSIÇÃO CORPORAL E BIOMARCADORES DE PROFISSIONAIS DE ENFERMAGEM

RESUMO

Fundamento: os biomarcadores e as circunferências corporais podem predizer riscos futuros à saúde cardiovascular dos indivíduos. Objetivo: determinar a correlação entre a circunferência do pescoço, com a composição corporal e os marcadores inflamatórios homocisteína, fibrinogênio e proteína C reativa em profissionais de enfermagem. Métodos: realizou-se uma pesquisa descritiva transversal da qual participaram 58 profissionais de enfermagem do gênero feminino, com uma faixa etária de 18 a 69 anos, de um hospital público em Belém-PA. Foram avaliadas variáveis antropométricas como peso, altura, circunferências, diâmetros ósseos e exames laboratoriais. Resultados: as correlações Lineares de Pearson não indicaram significantes associações entre a circunferência do pescoço e os biomarcadores Proteína C Reativa (r=-0,01, P=0,92), Fibrinogênio (r=-0,15, P=0,25) e Homocisteína (r=0,03, P=0,78), todavia, houve fortes e significantes correlações entre a circunferência do pescoço e variáveis antropométricas como o índice de massa corporal (r=0,78, P<0,0001), circunferência da cintura (r=0,83, P<0,0001), percentagem de gordura corporal (r=0,71, P<0,0001) e o percentual de massa muscular corporal (r=-0,62, P<0,0001). Conclusão: não houve correlações significantes entre a circunferência do pescoço, e os marcadores inflamatórios e as variáveis metabólicas das profissionais pesquisadas, todavia, houve uma forte e significante correlação entre a circunferência do pescoço e as variáveis antropométricas.

PALAVRAS-CHAVE: biomarcadores, pescoço, composição corporal.