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Original Article

Prevalence of Abdominal Obesity and Associated Factors in University Students of Ecuador

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ABSTRACT

Introduction: Abdominal obesity is a risk factor for the development of cardiovascular diseases and its presence in the population under 30 represents a public health problem.
The aim of this study is to demonstrate the presence in this population group and to identify its associated factors. Methodology: This study has a transversal design, when from a universe of 19000 students it takes by probability sample number of 320, then the laboratory and anthropometrics variables related to central obesity in university students were extracted, analyzed by descriptive statistics and prove by a contrast test like T of student, Chi2, Pearson correlations and ROC curve to determine predictive model associated with the condition
Results: Abdominal obesity has a 16,2% of the university population, the anthropometric values such as BMI and hip circumference are significantly associated to abdominal obesity p<0,001, Lab values as PCR and Uric acid performs with a great security in patients with central obesity especially in those below 25 years p=0,009
Conclusion: Abdominal obesity it´s increasing condition in university students and bad habits are related to them with serious risk of vascular damage that has no symptoms until it shows as cardiovascular or cerebrovascular outcomes.

1. INTRODUCTION

Abdominal obesity is the abnormal accumulation of adipocytes in the waist of an individual, which may contribute to the development of heart disease over time. The criteria for diagnosing abdominal obesity according to the American Heart Association according to the abdominal perimeter are; In European males> = 102cm,
In Asian males> = 90 cm, in Euro-American women> = 88 cm and in Asian women> = 80 cm. All these values are measured with a tape measure in the usual anthropometric evaluation in the medical or nutritional office together with blood pressure. [1]

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The presence of obesity involves many other biochemical events such as dyslipidemias, vascular endothelial damage, alterations in insulin function and renal filtration, among others [2, 3]. The association with cardiovascular problems is also demonstrated as a consequence of the aforementioned alterations. [4]

Lately, other events have been associated with the presence of fatty liver in obese patients, regardless of age and gender, causing a change in some cases irreversible to chronic liver disease without presence of the main agent that was alcohol, passing Unnoticed this fact. [5-7]

Certain studies have detected the presence of certain substances associated with vascular damage prior to a cardiac or cerebrovascular ischemic event. One of these substances is C-reactive protein (CRP) and uric acid. [8-10] The importance of these findings could determine a preventive treatment in these patients in addition to lifestyle changes, such as blood pressure and blood glucose control.)

Some authors in South America have demonstrated the presence of these modifiable and non-modifiable cardiovascular risk factors, especially overweight, dyslipidemia and the presence of systolic hypertension, an alarm for possible ischemic and cerebrovascular events that could develop before the age of 30 years in the population Asymptomatic. [14-16]

This study aims to identify the prevalence of abdominal obesity and which are the cardiovascular risk factors associated in students under 25 years

2. METHODOLOGY

Design and Population

A cross-sectional study was designed which selected the university population of the Catholic University of Santiago de Guayaquil in the period from March to June 2015, these students voluntarily completed a question form and were given a sample of Fasting blood and its anthropometric measures by the research group. The size of the sample was made by a normal probabilistic sampling, stratified and adjusted by the weighting of students by faculty, which from a universe of 19450 students approximately a sample of 320 students

Instruments

The information was collected in forms of google docs, within the university campus and the variables analyzed were: age in years, gender; Male and female, BMI (Weight / height2), waist and hip circumference in cm, consumption of alcohol in cc, smoking tobacco, tea or other drinks consumption week, exercise in times per week. Blood samples were taken to perform; [17, 18] and the presence of HGNA in the presence of HGNA in the presence of HGNA, in the presence of HGNA,

Sampling Methodology

Students were selected by sampling of convenience, which allowed to recruit those present at the time of collection, who agreed to participate in the study signing the informed consent previously.

Statistic analysis

The initial descriptive statistical analysis by means of a tabulation according to the presence or absence of abdominal obesity through the abdominal perimeter, which classifies the anthropometric, sociodemographic and laboratory variables by group, in addition to obtaining a p value by means of the chi Pearson's square in the categorical qualitative variables, and Kruskal Wallis for the ordinal ones. In the case of continuums we used Student's T or square CHI2 if we distributed non-normal, all these calculations to a level of 95% of significance in SPSS software version 22.0 for MAC.

Thereafter, correlations between the presence of abdominal obesity and laboratory variables will be performed in an unadjusted model and later in a model adjusted by the age of less than 25 years. From these laboratory parameters a predictive model will be made by logistic regression without adjusting and adjusting to the aforementioned age allows us to better estimate abdominal obesity and associated vascular damage.

Ethical Considerations

This research was approved by the institutional bioethics committee of the Catholic University of Guayaquil code CEIUCSG-002-2014, this research will not administer any medication or substance to the study participants, but will extract blood samples from participants who voluntarily wish to participate in the study. Study signing an informed consent

3. RESULTS

The prevalence of abdominal obesity is 16.2%, within the sociodemographic variables, although there is a slight difference to the female sex, no other factor is associated with abdominal obesity except for the presence of mildly significant hepatic steatosis. In contrast, in the clinical variables Table 1.2 we have that the anthropometric ones such as BMI and hip circumference are significantly associated to abdominal obesity as expected, but, in addition, CRP and uric acid are also associated with abdominal obesity, so the rise Of cholesterol and low HDL in both cases significantly (Table1)

When correlating the laboratory variables with the presence of abdominal obesity, we find that in the unmodified crude model that CRP, total cholesterol, uric acid and triglycerides are significantly associated with obesity, in this case the only one that correlates negatively is HDL with A 24%, but the others do it positively increasing the possibility of having abdominal obesity, which I call more the attention PCR with 35% and in a very significant way (Table2)

In our predictive model analyzes we can observe that in the unadjusted model we can not have a statistically significant variable, however, when adjusting our model in the case of those under 25 years old, the significance of the CRP that

implies the risk of vascular damage is notorious By this protein in this age group, HDL remains neutral in this group. In the group over 25 years of age, although there is no significance, it is clear that the same PCR and uric acid represent markers of associated vascular damage and cholesterol to a lesser extent.(Table 3.1, 3.2)

Finally we decided to demonstrate if our previously associated laboratory values were reliable and we used the ROC curve that combines sensitivity and specificity to identify the one with the highest predictability, in this case the CRP shows a better confidence than uric acid, with 76% Of reliability vs. 65% of the second. (Table 4)

Table 1.1: General characteristics per abdominal obesity

Abdominal obesity							
		Absent N=293 (83,8%)		Presented N=57 (16,2%)		Total 350	Pvalue
		Frecuency	% column	Frecuency	% column		
Gender	F	157	53,6%	29	50,9 %	186	0,708
	M	136	46,4%	28	49,1 %	164	
Alcohol consumption	absent	143	48,8%	27	47,4 %	170	0,089
	mild	114	38,9%	17	29,8 %	131	
	moderate	36	12,3%	13	22,8 %	49	
Smoking	absent	232	80,3%	39	68,4 %	271	0,179
	Mild	41	14,2%	14	24,6 %	55	
	Moderate	14	4,8%	4	7,0%	18	
	severe	2	0,7%	0	0,0%	2	
Coffeeconsumption	absent	196	67,8%	40	70,2 %	236	0,689
	Mild	81	28,0%	14	24,6 %	95	
	Moderate	9	3,1%	3	5,3%	12	
	severe	3	1,0%	0	0,0%	3	
Exercise	absent	14	4,8%	1	1,8%	15	0,081
	Mild	164	56,7%	24	42,1 %	188	
	moderate	76	26,3%	23	40,4 %	99	
	severe	35	12,1%	9	15,8 %	44	
Steatosis	absent	109	62,6%	10	40,0 %	119	0,033*
	Mild	42	24,1%	13	52,0 %	55	
	Moderate	19	10,9%	2	8,0%	21	
	severe	4	2,3%	0	0,0%	4	

* significant value

Table 1.2: Laboratory characteristics with abdominal obesity

	Abdominal obesity				
	Present		Absent		
	Average	ED	Average	ED	PValue
BMI	28,15	17,44	25,44	8,41	<0,001**
Hip perimeter	99,40	10,93	102,08	9,41	<0,001**
Calories24hours	1106,12	758,38	1086,63	824,19	0,899
Glucose	73	12	70	13	0,598
PCR	1,42	1,74	1,73	1,48	0,0019**
uricacid	4,67	1,48	4,62	1,65	0,0263*
SBP	113,56	11,66	111,14	10,81	0,248
DBP	71,93	9,82	70,65	8,89	0,467
Cholesterol	151	31,61	174,88	25,25	0,033*
HDL	47,66	11,68	39,05	3,62	0,032*
LDL	89	25	100,52	39,10	0,236
Age	20,53	2,75	21,29	8,31	0,189
Triglycerides	78,98	44,20	121	49,25	0,012**

*Significance at 95%

** significance at 99%

Table 2: Correlation between Laboratory Values and Abdominal Obesity Models

Modelo Crudo		Modelo ajustado a edad<25 años		Modelo ajustado a edad >25 años	
Glucose	0.0621	Glucosa	0.0108	Glucosa	-0.8151
sig	0.5989		0.9307		0.1849
PCR	0.3545	PCR	0.3656	PCR	0.3817
sig	0.0019 **		0.0023*		0.6183
UricAcid	0.2582	Ácido úrico	0.1667	Ácido úrico	0.3322
sig	0.0263*		0.1776		0.6678
Cholesterol	0.2475	colesterol	0.1951	colesterol	0.6019
sig	0.0335*		0.1137		0.3981
HDL	-0.2493	HDL	-0.2385	HDL	-0.5565
sig	0.0322*		0.052		0.4435
LDL	0.1392	LDL	0.26	LDL	-0.9071
sig	0.2369		0.0336*		0.0929
Triglycerides	0.2968	triglicéridos	0.1953	Triglicéridos	0.9189
sig	0.0102**		0.1132		0.0811
Calories 24hours	-0.0087	Calorías/24h	-0.0374	Calorías/24h	.
sig	0.8998		0.6008		.

*Significance at 95%

** significance at 99%

Las Cell Has Coeficiente Correlation Of 0,865 And Significance Of 0,456

Table 3.1: Predictive Models of Lab Markers for Abdominal Obesity, crude model

CrudeModel				
	Odds Ratio	P>z	[95% Conf. Interval]	
Triglycerides	1.024696	0.973	0.2460377	4.267647
LDL	0.9550641	0.99	0.0007646	1192.919
HDL	0.8655225	0.968	0.0006919	1082.646
Cholesterol	1.052011	0.989	0.0008424	1313.723
UricAcid	1.356119	0.569	0.4753215	3.869086
Glucose	1.248762	0.115	0.9474229	1.645947
PCR	0.7972338	0.681	0.2707969	2.347079
Calories 24horas	0.9991732	0.432	0.9971157	1.001235
_cons	4.45E-09	0.105	3.46E-19	57.1488

Table 3.2: model adjusted to age under 25 years Model adjusted to <25 years

a. adjusted to <25 years

	Odds Ratio	P>z	[95% Conf. Interval]	
PCR	1.711148	0.009	1.142909	2.561908
HDL	0.9094767	0.052	0.8263976	1.000908
LDL	1.026052	0.05	0.9999764	1.052807

b. adjusted to >25 years

	Odds Ratio	P>z	[95% Conf. Interval]	
PCR	1.290238	0.565	0.5420384	3.071213
UricAcid	2.753518	0.21	0.5645703	13.42944
Cholesterol	1.119427	0.209	0.938812	1.33479

Table 4: ROC Analyze of the significant lab values related with Abdominal Obesity

	AUC	error	bootstrap	IC95%	
PCR	0.7623932	-0.0001682	0.0840643	0.5976303	0.9271561
UricAcid	0.6547619	0.0000122	0.1053934	0.4481947	0.8613291

4. DISCUSSION

In this study we obtained a general prevalence of abdominal obesity of 16.2% lower than that of Castellanos and collaborators in 2011 of 30.6% in Spain and less than that of Gonzalez et al in Mexico 2014 of 33.3%. [6, 19, 3]

Other studies have shown alterations in their BMI as being overweight, but have not been classified as obesity and did not measure waist circumference. [15, 16] The level of sedentary lifestyle of 40-50% in obese people is very close to those found by García and García in 2012, however our blood pressure levels of 1.8% are in contrast to 0% of arterial hypertension in this study [15] whereas the presence of non-alcoholic fatty liver is 58% in this study is superior to other studies such as that of Ampuero et al., Of 25%. [19]

The laboratory values of enhancement in this study were the PCR, uric acid and HDL that as the literature says are altered in patients with obesity, of these the most predictive in this study was the PCR in children under 25 with an OR Of 1.71 (95% CI 1.14-2.56) p <0.05. In addition to being the most reliable model according to ROC analysis with 76%, it gives results similar to a study that demonstrate that association with obesity in adults and is chosen as A value of vascular damage. [10, 20]

In relation to total cholesterol and its differential, in this study there is an association of total cholesterol with abdominal obesity, but the HDL fraction is the one that decreases as well as other studies evidencing the cardiovascular risk similar to González et al., Ampuero et al ,García et al, Hernández et al and Sandoval et al [15, 16, 19]

5. CONCLUSION

The presence of abdominal obesity exceeds 15% of the university population and is associated with alterations of other laboratory parameters such as the low HDL cholesterol and the elevation of the acute phase reactant and vascular damage PCR. Therefore, the detection of this type of obesity is vital importance to carry out treatment of change of lifestyle and in certain pharmacological cases to reduce the cardiovascular risk that these students present due to their bad nutritional habits before the 30 years.

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