Short Communication

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Frequency of Abdominal Obesity and Its Relationship with Blood Factors and Blood Pressure Indices in Candidates for Elective Angiography Referring to Heshmat Hospital in Rasht in 2016

M. Mahdavi-Roshan(PhD)[1,2], A. Salari(MD)*[1], M. Shakiba (PhD)[3], M. Naghshbandi(MD)[1], M. Gholipour(MD)[1]

1.Cardiovascular Disease Research Center, Heshmat Hospital, Guilan University of Medical Sciences, Rasht, I.R Iran.

2.Department of Social Medicine, Faculty of Medicine, Guilan University of Medical Sciences, Rasht, I.R Iran

3.Faculty of Public Health, Guilan University of Medical Sciences, Rasht, I.R Iran.

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ABSTRACT

BACKGROUND AND OBJECTIVE: Considering the relationship between abdominal (central) obesity and chronic diseases and disorders of biochemical factors, as well as the role of ethnicity and geographical area on the relationship between obesity and chronic diseases, this study aims to determine the prevalence of abdominal obesity and its relationship with biochemical and blood pressure indices in candidates for angiography.

METHODS: This cross-sectional study was performed on 610 subjects aged 25-75 years who were candidates for elective angiography and were referred to Heshmat Hospital in Guilan province in 2016. Data were collected by interview, medical records, blood pressure measurements and anthropometric indicators, including weight, height, body mass index and waist circumference. Fasting blood samples were used for biochemical indices. Abdominal obesity was determined based on waist circumference more than 102 cm in men and more than 88 cm in women.

FINDINGS: In this study, 348 (57%) patients had abdominal obesity. 29% of men (101 patients) and 71% of women (248 patients) had abdominal obesity and there was a significant relationship between gender and abdominal obesity (p=0.0001). There was a significant different between patients with abdominal obesity and non-obese subjects in terms of total cholesterol (161±40 vs. 153±41 mg/dl, p=0.04), HDL cholesterol (44±8.6 vs. 43±8.2 mg/dl, p=0.01) and hematocrit (39±4.1 vs. 41±4.4 mg/dl, p=0.001). The variables of age, gender, and BMI were independent predictors of abdominal obesity. The incidence of abdominal obesity was 37 times higher in women and increased significantly with age. The chance of obesity increased by 1.25 per unit body mass index increase.

CONCLUSION: The results of this study demonstrate the prevalence of abdominal obesity in candidates for elective angiography and its association with some blood factors.

KEY WORDS: *Central (Abdominal) Obesity, Blood Factors, Blood Pressure.*

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***Corresponding author: A. Salari(MD)**

Address: Cardiovascular Disease Research Center, Heshmat Hospital, Guilan University of Medical Sciences, Rasht, I.R Iran.

Tel: +98 13 33618177.

E-mail: a.salari55@gmail.com

Introduction

Over the last two decades, overweight and obesity has been rising in the world. According to the studies, there is a significant relationship between obesity and chronic diseases (1). In 2010 in Iran, the prevalence of overweight and obesity in men and women was 42.8% and 57% (2), and by 2020 these figures are expected to reach 54 and 74% (3), respectively. The results of the studies show that the incidence of abdominal obesity is rising along with general obesity (1).

According to the results of a study, 33.8% of Iranian adults suffer from abdominal obesity, and men are four times more likely to suffer from this problem compared to women (4, 5). According to studies, abdominal obesity is a better predictor of the function of the body organs and the development of chronic diseases compared to general obesity (6). Many of the important complications of obesity, such as heart disease, insulin resistance, diabetes, hypertension and hyperlipidemia, are mainly related to abdominal fat (7-11). There are many factors that cause abdominal obesity; genetic factors, increased energy intake, inactivity, environmental factors, and psychological factors are among these factors (1, 7).

Obesity is evaluated in different ways depending on its type. Measuring the weight and body mass index (BMI) indicate general obesity (peripheral obesity), while measuring waist circumference, waist to height ratio, waist to hip ratio and conicity index, reflects central obesity (abdominal obesity) (12). Varied results have been reported regarding the association between these indices and the severity of coronary artery disease and cardiovascular disease (13, 14). Some studies have examined the effects of age, gender, ethnicity, race and geographical area on the relationship between different anthropometric indicators and the incidence of heart disease. Evidence suggests that people with high abdominal fat have insulin resistance even if they are not obese (15). It seems that central obesity in adults leads to major metabolic problems such as diabetes, hypertension, dyslipidemia, and ischemic heart disease (16-19).

In a study by Orces et al. (20) among people with heart disease risk factors in Ecuador, the prevalence of abdominal obesity was 65.9% and the incidence of abdominal obesity was higher in people living in urban areas. Men with abdominal obesity had a 51% higher chance of having hypertension and diabetes. In a study among the adults in Latin America, China and India, there was a significant correlation between abdominal obesity and hypertension among adults (21). Rodrigues et al. (22) in a study showed that serum levels of triglycerides and glucose in women with abdominal obesity were higher than other women. Considering the association between abdominal obesity and chronic diseases and disruption of biochemical parameters, as well as the role of ethnicity, race and geographical area on the relationship between different indices of obesity and chronic diseases, the present study was conducted to determine the prevalence of central obesity and its relationship with serum uric acid levels, glycosylated hemoglobin, hypertension and lipid profiles in adult subjects who were candidates for elective angiography and referred to Heshmat Hospital in Guilan province.

Methods

After obtaining approval from the Ethics Committee of the Guilan University of Medical Sciences (IR.GUMS.REC.1395.97), this cross-sectional study was conducted among 610 men and women aged 25-70 years who referred to Heshmat Heart Hospital in Rasht for elective angiography in 2016. Candidates for elective angiography, lack of infectious diseases, rheumatoid arthritis, chronic renal failure and inflammatory diseases, not using corticosteroids were included in the study. Convenience sampling was done based on the inclusion criteria.

A trained nurse selected the patients every day based on the inclusion criteria in angiography section. Informed written consents were obtain from all participants. Patients were excluded from the study if they did not want to participate. Personal information and variables related to age, gender, smoking, residence and education were collected by questioning individuals and completing the designed forms. Patients' files were used to collect medical information. Blood pressure was measured in a sitting position using a pressure gauge on the right arm after 5 minutes of rest. Systolic blood pressure above 140 mmHg and diastolic blood pressure above 80 mmHg was considered as hypertension (21).

Venous blood samples were collected from each person after 12 hours of fasting and blood glucose, lipid profile, creatinine, uric acid and BUN were tested by the hospital laboratory. Blood glucose above 126 mg/dl, serum creatinine above 1.3 mg/dl, LDL above 130 mg/dl, and total cholesterol above 200 mg/dl were considered as abnormal values (14). A lever scale with

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a precision of 0.1 kg connected to a stadiometer with a precision of 0.1 cm was used to measure the height and weight of participants. Measuring the height and weight of people was done without shoes and with the least clothes. Finally, body mass index (BMI) was calculated based on the formula. Body mass index of 18.5-24.9 kg/m^2 was considered as natural body mass (6). Waist circumference was also measured using tape measure. To measure waist circumference, the meter was held in one direction, in the middle of the space between the last rib and the hip bone. Subjects were divided into two groups based on waist circumference: subjects with abdominal obesity and non-obese subjects. Considering the international standards, waist circumference higher than 102 cm in men and higher than 88 cm in women were considered as abdominal obesity in this study (23). After collecting the data, the Stata 13 software was used for statistical analysis. A multivariate logistic regression analysis was used to estimate the odds ratio of each variable in relation to abdominal obesity index. The variables that had a significant level lower than 0.1 in a single-variable analysis were entered into the multivariate logistic model for modification and p<0.05 was considered significant.

Results

The mean age of the study population was 58±9.1 years. 338 patients (45%) were female and 272 patients (55%) were male. Of 610 participants, 348 had abdominal obesity and the prevalence of abdominal obesity was 57% according to international standards. The mean waist circumference was found to be 98±13.9 cm in study subjects, 95 cm in men and 102 cm in women. According to Iran's standards, which consider abdominal obesity index waist circumference more than 95 cm, the prevalence of abdominal obesity in the population was estimated to be 60.7%. In terms of gender, 101 (29%) patients had abdominal obesity and 248 (71%) women. There was a significant statistical relationship between gender and abdominal obesity (p=0.001). The mean age of subjects with abdominal obesity was significantly higher than non-obese subjects (p=0.001) (Table 1).

In this study, 51% of patients (177 patients) with abdominal obesity lived in the city and 49% (171 people) lived in the village. The prevalence of smoking in subjects with abdominal obesity was 39 patients (11%), which was significantly lower than non-obese subjects (p=0.001). On the other hand, 53% and 45% of patients with abdominal obesity reported a history of hypertension and diabetes, respectively, which was significantly higher than non-obese subjects (p=0.001). The mean total cholesterol (p=0.04), HDL cholesterol (p=0.01) and hematocrit (p=0.001) in subjects with abdominal obesity was significantly higher than non-obese subjects (Table 1).

Table 1. Distribution of demographic characteristics and underlying risk factors in terms of abdominal obesity

Variables	Abdominal obesity Mean±SD does not have	Abdominal obesity Mean±SD has	P-value
Gender			
Male	237±90	101±29	0.001
Female	24±9	248±71	
Age (year)	57±9.1	59±8.9	0.001
Place of residence			
City	163±62	177±51	0.005
Village	99±38	171±49	
Smoking	75±29	39±11	0.001
Hypertension	81±31	183±53	0.001
Diabetes	73±28	158±45	0.001
Level of Education			
Illiterate	69±26	160±46	0.001
Lower than diploma	123±47	156±45	
Academic	70±27	32±9	
Triglyceride level (mg/dl)	155±110	160±92	0.51
Total cholesterol level (mg/dl)	153±41	161±40	0.04
HDL cholesterol level (mg/dl)	43±8.2	44±8.6	0.01
Hematocrit (%)	41(4.4)	39(4.1)	0.001
Uric acid (mg/dl)	5.22±1.35	5.04±1.39	0.12
HbA1C (%)	6.48(2.02)	6.59(1.83)	0.58

p<0.05 levels are significant.

The results of multivariate regression analysis showed that age, gender and body mass index are independent predictors of abdominal obesity. The chance of abdominal obesity increased significantly with age. There was a significant difference in the chance of abdominal obesity in men and women, and the chance of abdominal obesity in women was 37 times more than men (95% confidence interval: 73.4±18.6). Moreover, the chance of abdominal obesity increased by 1.25 per one unit increase in body mass index (95% confidence interval: 1.17-1.33) (Table 2).

Table 2. Relationship between underlying variables and other factors, and central obesity in regression model

Variable	Odds ratio	CI-95%	P-value
Gender (female)	37.01	18.6–73.5	0.0001
Age (year)	1.05	1.02–1.08	0.001
Body mass index (kg/m2)	1.25	1.17–1.33	0.001
Smoking	1.62	0.87–3.01	0.126
Level of Education			
Illiterate	1	-	-
Lower than diploma	0.94	0.51–1.72	0.84
Academic	0.44	0.19–1.02	0.06
Location (City)	0.89	0.52–1.50	0.67
Diet	1.26	0.69–2.28	0.44
High blood pressure	1.39	0.84–2.31	0.19
Type 2 diabetes	1.44	0.85–2.43	0.17
HDL cholesterol (mg/dl)	1.00	0.97–1.04	0.82
Cholesterol (mg/dl)	0.99	0.99–1.00	0.54
Hematocrit (%)	1.04	0.98–1.11	0.17

Discussion

According to the present study, a high percentage of candidates for angiography had abdominal obesity while the chance of abdominal obesity in women was 37 times more than men. According to research, central obesity is far more dangerous than the accumulation of fat elsewhere in the body and in regard with chronic illnesses, the type of body fat distribution is more important than general obesity. The increase in the prevalence of obesity in Iran and other countries is largely similar. However, the prevalence of abdominal obesity in Iran has been reported to be several times more than other countries (2, 3). Dc Moraes et al. estimated the prevalence of abdominal obesity in developing countries to be 3.8% to 51.7% and in developed countries from 7.8% to 33.2% (5).

Heshmat et al. reported the prevalence of central obesity in Iran between 54.7% and 84.6% (24). In the present study, the prevalence of abdominal obesity in males and females in Guilan province was estimated to be 29% and 71%, respectively, and the incidence of abdominal obesity in women was 37 times (or 370%) higher than men. In a study by Mohtasham Amiri in Guilan province, the prevalence of abdominal obesity in female students of Guilan University was 14.8% (25). In addition, in the study of Azadbakht et al. in Tehran, the chance of abdominal obesity in women was 8 times more than that of men (26). The difference in the prevalence of obesity between the genders is probably because of less physical activity of women due to their limitations for outdoor exercise activities for cultural reasons and lack of access to sports facilities. Furthermore, the higher prevalence of abdominal obesity in women can be attributed to the high prevalence of marriage at an early age and the number of pregnancies and births. Since, according to studies, marriages at an early age are quite common in the north of Iran, and factors related to sex hormones also have an obvious effect on women's obesity. In most European and American studies, the prevalence of abdominal obesity is higher in males than in females (9). However, in Iran and most countries in the Middle East, there is a specific pattern of abdominal obesity, in which women have more abdominal obesity, and more studies on Middle East population are required to find the reasons.

The mean age of subjects with abdominal obesity is 59.2 years and the mean age of non-obese people is 57 years and the age factor increases the chance of abdominal obesity by 1.05 times, which is consistent with other studies, as in the study of Rodriguez et al., there was a significant relationship between age and abdominal obesity (27). In the study of Sibai et al., the prevalence of abdominal obesity at age 60 increased significantly in both genders (28). In studies in other countries, age has been one of the predictors of obesity (23, 24). Another finding of this study was a significant correlation between BMI and abdominal obesity, and BMI higher than 30 kg/m^2, increased the incidence of abdominal obesity by 1.25%. According to the study of Sturm in the United States, the prevalence of abdominal obesity was nearly twice the prevalence of obesity and the prevalence of abdominal obesity has increased sharply in recent years (29). In recent years, obesity has been rising in developing countries due to increase in urbanization and changes in the lifestyle. In a study in Tehran, a significant increase in the incidence of abdominal obesity and BMI was observed within a period of less than 5 years (30). In the present study, high blood glucose and diabetes as a component of metabolic syndrome did not have a significant relationship with the incidence of abdominal obesity. But despite this lack of relationship, it increased the chance of having abdominal obesity by 44%. In a study by Bari et al. in

Sweden, abdominal obesity was observed in 33% of diabetic men and 57% of diabetic women (31). In the study of Wright-Pascoe et al. in Jamaica, the prevalence of abdominal obesity was significantly higher in diabetics (32). This can be due to lower mobility and exercise, and perhaps even nutritional issues, which requires further studies. In the present study, there was no significant correlation between triglyceride, cholesterol and HDL levels and the prevalence of abdominal obesity. In other words, in the present study population, abdominal obesity did not have a significant effect on lipid profile as well as serum uric acid. A study by McNaughton et al. in Brazil showed that levels of triglycerides and HDL increase with respect to patient's weight, but these indices did not have an effect on abdominal obesity (33), which is consistent with the present study.

Despite previous studies that showed a positive correlation between blood pressure and abdominal obesity, there was no significant correlation between blood pressure and abdominal obesity among people living in northern Iran. This study had limitations. Due to the cross-sectional nature of the study, it was not possible to analyze the causal relationship between the risk factors for abdominal obesity. Therefore, further studies, such as collaborative and prospective studies with long follow-up for patients, are required to identify the variables that are probable to increase the incidence of abdominal obesity.

The results of this study indicate an increase in the prevalence of abdominal obesity in adults with cardiac risk factors in Guilan province, which may be due to changes in lifestyle patterns, particularly lack of exercise, and increased consumption of high-calorie foods and possibly more tendency towards Western food patterns and moving away from traditional Guilan food patterns. Therefore, it is suggested to develop educational programs to improve the nutritional pattern, lifestyle, mobility and more exercise, especially in women, in order to prevent central obesity and its complications and promote community health.

Conflict of Interest: No conflicts of interest.

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