Int J Endocrinol Metab. 2010;8(3):143-146
International Journal of
Endocrinology & Metabolism
Journal home page: www.EndoMetabol.com

Evaluation of abdominal obesity prevalence in diabetic patients and relationships with metabolic syndrome factors

Reza Derakhshan Davari [1*], Asghar Khoshnood [2]

[1] Department of Pediatrics, Rafsanjan university of medical sciences, Rafsanjan, IR Iran
[2] Department of Internal Disease of Sciences, Rafsanjan University of Medical Sciences, Rafsanjan, IR Iran

ARTICLE INFO

Article Type:
Original Article

Article history:
Received: 25 Nov 2010
Revised: 10 Dec 2010
Accepted: 1 Jan 2011

Keywords:
Abdominal obesity
Type 2 diabetes
Metabolic syndrome

ABSTRACT

Background: Obesity is one of the primary risk factors of metabolic syndrome and type 2 diabetes.
Objectives: Considering that appropriate treatment of several metabolic syndrome disorders is a key for effectively decreasing of mortality, morbidity and disability and also because of the increasing prevalence of obesity in the past century, this study was conducted to detect the prevalence of abdominal obesity and its statistical relationhip with other components of the metabolic syndrome.
Materials and Methods: This cross-sectional descriptive study was conducted on 1,392 type 2 diabetic patients between the ages of 30 and 83. Following laboratory and clinical evaluations and completion of questionnaires, data were statistically analyzed using Chi-square and Fisher's exact tests for the qualitative data and t tests for the quantitative data.
Results: Among 1,392 patients with type 2 diabetes, 810 patients (58.2%) had abdominal obesity, including 46 men (5.7%) and 764 (94.3%) women. According to NCEP ATPIII1, 768 patients (94.8%) had metabolic syndrome. Significant relationships were observed between abdominal obesity and sex, hypertension, decreased HDL, and metabolic syndrome. ($P < 0.01$). However, no significant relationships were found between abdominal obesity and age or high TG ($P < 0.01$)
Conclusions: The results of this study indicated that obesity had the strongest relationship with metabolic syndrome, indicating the necessity of its control appropriately in diabetic patients.

Implication for health policy/practice/research/medical education:
The article will focus on the abdominal obesity prevalence in diabetic patients and relationships with metabolic syndrome factors. Reading this article is recommended to all Endocrinologists, Specialists in Internal Medicine, Medical Researchers.

Please cite this paper as:
Derakhshan Davari R, Khoshnood A. Evaluation of abdominal obesity prevalence in diabetic patients and relation ships with Metabolic Syndrome factors. *Int J Endocriol Metab.* 2010;**8**(3):143-6.

1. Background

Glucose impairment and type 2 diabetes are the manifestations of an expanded base called metabolic syndrome. This syndrome is a very common situation that results from some disorders such as abdominal obesity, hypertension (HTN), lipid disorder, insulin resistance, and glucose impairment. Patients suffering from metabolic syndrome are at risk of diabetes and cardiovascular diseases. Recent studies strongly emphasize that not only increasing glucose levels but also risk factors of cardiovascular diseases such as HTN, lipid disorders, and abdominal obesity should be treated diligently to help decrease the morbidity and mortality rates of cardiovascular diseases (1).

* *Corresponding author at:* Reza Derakhshan Davari, Department of Pediatrics, Rafsanjan University of Medical Sciences, Rafsanjan, IR Iran. Tel: +98-09131912845, Fax: +98-3918220022
Email: rderakhshan98@yahoo.com

In 1998 the World Health Organization offered a unique definition of insulin resistance's role in the diagnosis of metabolic syndromes (2). The expert panel committee has recently defined the detection, evaluation, and treatment of high blood cholesterol (Adult treatment panel III [ATPIII]) in American adults based on 3 or more criteria which had no necessity to study the insulin resistance (3). Every year 18,000,000 people die due to cardiovascular diseases; specifically diabetes and high blood pressure. The increasing prevalence of obesity is one of the biggest health problems of the 21st century and is also the most important risk factor of diabetes. Approximately 1.1 billion adults in all over the world are overweight, and 313 million of these individuals are obese (4). It has been estimated that about 80 to 90% of the patients with type 2 diabetes are overweight or obese. The risk of mortality for patients with cardiovascular disease and certain types of cancer rises as a person's body fat mass increases. This relationship between fat mass and physical complications exists in all cases of excess weight and in all age groups, even over 75 years (1). Although not many studies have examined the relationship between increased body fat mass and its physical ramifications in diabetic patients, the data that do exist suggest similar trends as found for the general population. In other words, diabetic patients who have less fat mass are more healthy (1).

Different studies have reported prevalence rates of metabolic syndromes ranging from 15 to 86% (5-10). Two studies on diabetic patients reported a similarly wide prevalence range of 13.7 to 90% (11, 12).

2. Objectives

Given the large variations in the prevalence of obesity in different countries, we conducted this research in a previously unstudied city in Iran far away from the country's political and economic center. The goal of this study was to assess the relationship, if any, between abdominal obesity and other metabolic syndrome contents.

3. Materials and Methods

This is a descriptive study with a nonrandom sample of 1,392 type 2 diabetic patients from the diabetic clinic of the Aliebne Abitaleb Hospital in Rafsanjan, in the small town of Kerman in 2006. We originally invited 1,500 patients, but 18 were eliminated because of inadequate information or laboratory tests. These patients were chosen randomly from the existing files of the diabetic clinic of the hospital. The diabetic patients were diagnosed while fasting, and resulted in blood glucose level was ≥ 126 mg/dL. A questionnaire was administered to ask patients their biographical information including age, sex, history of diabetes, and history of HTN. In this questionnaire we reviewed type 2 diabetic patients. The average onset of diabetes was over the age of 30, and none of the patients were insulin dependent. Blood pressure was measured at rest. The patients who were on medication for HTN were included. The waist of the patients, while standing, was measured by a single nurse and a unique meter in the iliac crest sheets. Then the main exams included TG, FBS, HDL, LDL, and total cholesterol. For these exams we used an Auto Analyzer set and calorimetric method (GOD for FBS and ChOD-pop for cholesterol and HDL and Pars Azmoon kit). All of these processes were conducted synchronically. The results from the questionnaire and the lab tests were recorded and entered into SPSS (version 15) and analyzed with ki2 and t tests for quality and t tests for quantitative data. The results are explained in *Tables 1-3* and *Figure 1-2*. P values under .05 were considered as significant. Among 1,392 type 2 diabetic patients, there were 429 (30.8%) men and 963 (69.2%) women. 94.3% of individuals with abdominal obesity were women *(Table 1)*.

4. Results

Among 1,392 type 2 diabetic patients, 429(30.8%) were men and 963 (69.2%) were women. Among people suffering from abdominal obesity, 94.3% were women *(Table 1)*.

The mean age of cases was 53.72, with an SD of 10.53 and a minimum and maximum of 30 and 85 years old, respectively. Additionally, the mean age of those suffering from abdominal obesity was 53.86, with a minimum of 30 and a maximum of 83 years old *(Table 2)*.

According to ATP III and NCEP standards, among the 810 (73.3%) patients with abdominal obesity, 594 persons had high blood pressure, which was statistically significant ($P < .01$)

Table 1. Absolute and relative distributions for the study variables

Variable	NO.(%)
Sex	
Male	429 (30.8)
Female	963 (69.2)
HTN	
Yes	959 (68.9)
No	433 (31.1)
High TG	
Yes	1070 (76.9)
No	322 (23.1)
Low HDL	
Yes	360 (25.9)
No	1032 (74.1)
Abdominal obesity	
Yes	810 (58.2)
No	582(41.8)
Metabolic syndrome	
Yes	1094 (78.6)
No	298 (21.4)

Table 2. Means and SDs of the study variables for cases with abdominal obesity, by sex.

Variable	Male	Female	Total
Age, y	54.7 ± 11.8 [a]	53.8 ± 10.4	53.8 ± 10.5
HDL, mg/dL	50.9 ± 21.8	55.3 ± 16.7	55 ± 17
TG, mg/dL	238.1 ± 87.8	226.4 ± 122.5	227 ± 120.8
Waist, cm	110.4 ± 12.9	93.3 ± 7.2	94.3 ± 8.6
Systolic blood pressure, mm Hg	143.2 ± 22.7	135.6 ± 21.5	136 ± 21.7
Diastolic blood pressure, mm Hg	82.2 ± 12.6	83.5 ± 10.7	83.6 ± 10.8

[a] Mean ± SD

Table 3. The prevalence of each metabolic syndrome factors on the basis of sex in the diabetic patients.

Metabolic syndrome factors	With metabolic syndrome, NO.(%)		Without metabolic syndrome NO.(%)	
	Female	Male	Female	Male
Abdominal obesity	738 (96)	30 (4)	26 (61.9)	16 (38.1)
Hypertention	362 (60)	236 (40)	247 (68.5)	114 (31.5)
High TG	305 (50.5)	298 (49.5)	251 (53.7)	216 (47.3)
Low HDL	108 (52.9)	96 (47.1)	34 (60.7)	22 (39.3)

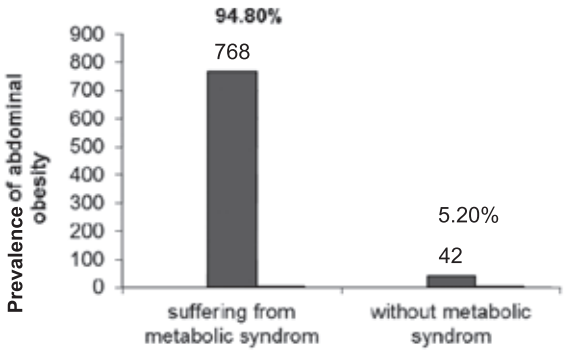

Figure 1. Prevalence of abdominal obesity based on metabolic syndrome in studied cases (Fisher exact test). (p <0.01)

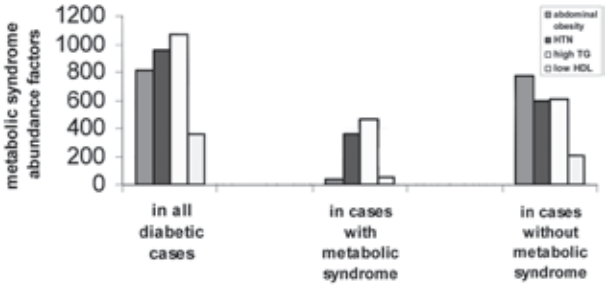

Figure 2. Comparing of the prevalence of each metabolic syndromefactors in diabetic population and their quantitative relation with abdominal obesity

Among the cases, 631 patients (77.9%) had high TG, and 238 (29.4%) had low HDL. The relationship between low HDL and abdominal obesity was significant as well.

The relationship between systolic and diastolic blood pressure with abdominal obesity was significant ($P < .05$). 768 patients had co-occurring metabolic syndrome and abdominal obesity. This relationship was significant ($P < .0X$; *Figures 1 and 2)*. Among diabetic cases (with or without metabolic syndrome), the most common metabolic syndrome was high TG, with an prevalence rate of 76.9%. Among all cases with some metabolic syndrome, abdominal obesity was the most common metabolic syndrome factor. This rate was 96% in women and 4% in men *(Table 2)*.

5. Discussion

In our study 768 people (94.8%) had metabolic syndrome. In Darwin, Ilane, and Vega's studies, the prevalence of metabolic syndrome was lower, ranging from 15 to 25% (6, 8, 10). Studies from Pakistan and Basra have reported prevalence rates ranging from 46 to 86% (5, 9). The findings from the third National Health and Nutrition Survey, which specifies the standards of ATP III, show that the prevalence of metabolic syndrome is about 20 to 30% in America. (7). In our study, 810 (58.2%) people had abdominal obesity, which was similar to the study on type 2 diabetic populations in Basrah, which reported an abdominal-obesity prevalence rate of 66.5% (9). In a study in Pakistan, the prevalence of abdominal obesity was reported at 30% (5). In Bari's study from Sweden, abdominal obesity was reported in 66 diabetic men (33% of the male sample) and 106 diabetic women (57% of the female sample) (13). In Wright-Pascoe's study from Jamaica, the prevalence of abdominal obesity in women was significantly more than the rate among men (90% versus 34.9%) (14). Similarly, our findings showed that women had a much higher rate of abdominal obesity, which may be caused by less physical exercise or exertion, less movement (women in this town still tend

to be housewives), and nutritional deficiencies, which must be studied separately. The mean age of people was 53.72, with an SD of 10.53. The mean age of cases with abdominal obesity was 53.86 years. There was no significant relationship between age and abdominal obesity in our study. This finding coincides with the findings from the Jamaican study (13).

According to ATPIII standards, among 810 people with abdominal obesity, 594 also had HTN ($P < 0.01$). This finding is similar to the results of the Basrah study (9).

No relationship was observed between high TG and abdominal obesity. Additionally, 29.4% of cases had low HDL. In another study, the rate of low HDL in people with abdominal obesity was reported at 45% (9). The findings in this study showed that abdominal obesity had the most quantative relationship with metabolic syndrome. Thus, these patients require changes in their lifestyle and precise control over diet, exercise, and behavior patterns. We recommend that future studies examine the relationhips between abdominal obesity and sex, physical exercises, diet, and how to control increasing triglycerides, blood-sugar levels, and blood-pressure levels and decreasing LDL cholesterol.

Financial support

None declared.

Conflict of interest

None declared.

Acknoledgment

The authors would like to thank Rafsanjan University of Medical Sciences for their assistance.

References

1. Association CD. *Canadian Diabetes Association 2003 clinical practice guidelines for the prevention and management of diabetes in Canada*. Canadian Diabetes Association; 2003.
2. Alberti KG, Zimmet PZ. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. *Diabet Med*. 1998;**15**(7):539-53.
3. Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). *JAMA*. 2001;**285**(19):2486-97.
4. Hossain P, Kawar B, El Nahas M. Obesity and diabetes in the developing world--a growing challenge. *N Engl J Med*. 2007;**356**(3):213-5.
5. Ashraf SMS, Ziauddin F, Jahangeer U. Metabolic syndrome in type-2 diabetes mellitus. *Pak J Med Sci July-September*. 2006;**22**(3):295-9.
6. Deen D. Metabolic syndrome: time for action. *Am Fam Physician*. 2004;**69**(12):2875-82.
7. Ford ES, Giles WH, Dietz WH. Prevalence of the metabolic syndrome among US adults. *JAMA: J Am Med Assoc*. 2002;**287**(3):356.
8. Johan G, Lindström J, Hämäläinen H, Keinänen S, Laakso M, Louheranta A. Prevalence of the Metabolic Eriksson, 7-Ilanne p Syndrome and Its Components. *Diabetes Care*. 2004;**27**:2135-40.
9. Mansour AA. The prevalence of metabolic syndrome among patients with type2 diabetes mellitus in Basrah. *Hypertension*.**106**:47.
10. Vega GL. Results of Expert Meetings: Obesity and Cardiovascular Disease. Obesity, the metabolic syndrome, and cardiovascular disease. *Am Heart J*. 2001;**142**(6):1108-16.
11. Hirani V, Zaninotto P, Primatesta P. Generalised and abdominal obesity and risk of diabetes, hypertension and hypertension-diabetes co-morbidity in England. *Public Health Nutr*. 2008;**11**(5):521-7.
12. Ragoobirsingh D, Morrison EY, Johnson P, Lewis-Fuller E. Obesity in the Caribbean: the Jamaican experience. *Diabetes Obes Metab*. 2004;**6**(1):23-7.
13. Bari MR, Ostgren CJ, Rastam L, Lindblad U. Abdominal obesity and insulin resistance in patients with type 2 diabetes in a Swedish community. Skaraborg hypertension and diabetes project. *Scand J Prim Health Care*. 2006;**24**(4):211-7.
14. Wright-Pascoe R, Lindo JF. The age-prevalence profile of abdominal obesity among patients in a diabetes referral clinic in Jamaica. *West Indian Med J*. 1997;**46**(3):72-5.