Age-Related Frequency of the Metabolic Syndrome in Type 2 Diabetic Patients

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Abstract: People with metabolic syndrome are at increased risk for developing diabetes mellitus. The present study aimed to assess the age related metabolic syndrome of patients diagnosed with type 2 diabetes mellitus. Data were collected from 293 diabetic subjects whom referred to the Department of Diabetes Center in Golestan University of Medical Sciences (2011). The metabolic syndrome was determined according to ATP III definition. In male and female subjects, the frequency of metabolic syndrome was 80.48% and 90.58%, respectively ($P<0.05$).The frequency of metabolic syndrome in ages 49-63 in female was higher than male. The frequency of metabolic syndrome was high in ages 34-48 and 49-63 years in both genders. This study showed that females were more affected than males. This may be due to the specific characteristics in the lifestyle changes between females and males diabetic patients among Gorgan inhabitants. Females are less educated in comparison with males diabetic. The majority of females with metabolic syndrome were householder. It seems that they do less physical activity at home. In Iran, females do less physical activity. Overweight and obesity were more seen between them. It seems that the female type 2 diabetic patients need to change their life style.

Key words: Gorgan · Metabolic syndrome · Type 2 diabetes · Age related

INTRODUCTION

Metabolic syndrome has become a major worldwide health problem. The prevalence of the metabolic syndrome is increasing generously by the epidemic of obesity whole the world [1]. The increasing of obesity and metabolic syndrome in whole of the world has been shown to cause in an increase of type 2 diabetes mellitus and cardiovascular disease [2] The prevalence of type 2 diabetes mellitus ranges from 1.2 to 14.6, 4.6 to 40 and 1.3 to 14.5 % in Asia, Middle East and Iran, respectively [3-4]. The person who suffers from type 2 diabetes is subjected to a sharp increase from the present figure of 125 million globally to 221 million by 2010 and to 300 million by 2025 [5]. In Asia, the enhancement in type 2 diabetes prevalence is extremely overwhelming in compare with the main increase occurring in young adults [6-7]. Lipid disorder, obesity, diabetes in general and high blood pressure are collectively defined as risk factors for cardiovascular disease triggered by metabolic syndrome [8].The metabolic syndromes have a correlation with the variations in genetic susceptibility, nutritional regiment, physical exercise, chronological age and gender which play direct role in the incidence of metabolic syndrome and its side effects [9]. Statistically, the incidence of metabolic syndrome is reported to be about 8 to 24.2% [10-11] and 7 to 46.5% [12-13] in men and women respectively. There are many reports in the literature supporting; in which metabolic syndrome as valuable index for vascular disease among general populations [14-16]. In our area, we do not have enough data about age related metabolic syndrome. The present study aimed to assess the age related metabolic syndrome of patients diagnosed with type 2 diabetes in Gorgan, Golestan province (South East of Caspian Sea), Iran.

MATERIALS AND METHODS

The present study was done in the Gorgan, Golestan province (South East of Caspian Sea), Iran in 2011. We had a study group included 293 patients of type-2 diabetes mellitus whom referred to the Department of Diabetes Center in 5th Azar Hospital in Golestan University of Medical Sciences. At this time of study, Gorgan has only one Diabetes Center. There were 170 females and 123 males. Data were collected by trained

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interviewers. The exclusion criterion was the coexistence of any other serious illness. Type-2 diabetes mellitus was defined as non-ketosis diabetes by medical history and current treatment with oral agent. None of the patients had micro vascular complications (diabetic nephropathy or retinopathy). Administration of insulin for glycaemic control was considered an exclusion criterion. A venous blood sample was collected from all the subjects who came after a 12-h overnight fast. The samples were centrifuged for 10 minutes at 3000 rpm. The serum was used for analyze of fasting blood sugar, triglycerides and HDL-cholesterol concentration in those who had type-2 diabetes mellitus. Fasting blood sugar, triglycerides and HDL-cholesterol levels were measured by biochemical kits using spectrophotometer techniques (Model JENWAY 6105 UV / VIS) in the laboratory of Biochemistry (Faculty of Medicine). Waist circumference was measured at the point halfway between the lower border of ribs and the iliac crest in a horizontal plane [17]. Type 2 diabetic subjects were considered to have metabolic syndrome if they had any two of the following four criteria, according to the modified ATP III (Adult Treatment Panel III) [18].

- Abdominal obesity: WC =102 cm in males and =88 cm in females.
- Hypertriglyceridemia: serum triglycerides level = 150 mg/dl.
- Low HDL-cholesterol: < 40 mg/dl in males and < 50 mg/dl in females.
- High blood pressure: SBP = 130 mmHg and/or DBP = 85 mmHg

The results are reported as percentages and mean± SD. The statistical analysis was done with SPSS- 11.5 version software. The results were evaluated by using the independent-sample 't' test and Chi-squared test. Statistical significance was considered at P < 0.05.

RESULTS

A total of 293 subjects with type-2 diabetes were studied. Table 1 shows the Frequency of the components of the metabolic syndrome among type 2 diabetic male and female subjects. The mean age of males and females patients were 53.93±10.83 and 52.64±9.63 years, consisting of 170 (58.02%) females and 123 (41.97%) males. High blood pressure was found in 55.28% and 42.35% in male and female subjects, respectively. High triglyceride was found in 53.65% and 53.52% in male and female subjects, respectively. 67.05% and 93.52% females and 50.40% and

Table 1: Frequency of the components of the metabolic syndrome among type 2 diabetic subjects

Parameters	Males (n=123)	Females (n=170)
Ages (years)	53.93±10.83	52.64±9.63
High fasting blood glucose (%)	100	100
High blood pressure (%)	55.28	42.35
High triglyceride (%)	53.65	53.52
Low serum HDL-cholesterol (%)	50.40	67.05*
Abdominal obesity (%)	76.42	93.52*
Metabolic syndrome (%)	80.48	90.58

*P value less than 0.05 was considered significant.

Table 2: Distribution of type 2 diabetic subjects according to gender and age

Age groups in years	Males (n=123)	Females (n=170)
19-33 n (%)	4 (3.25)	5 (2.94)
34-48 n (%)	34(27.64)	47(27.64)
49-63 n (%)	62(50.40)	100(58.82)
64-78 n (%)	23(18.70)	18(10.58)

Table 3: Type 2 diabetic subjects with and without metabolic syndromeaccording to ATP III by gender and age

	Males (n=123)		Females (n=170)	
Parameters	With MS	Without MS	With MS	Without MS
Age groups in years				
19-33 n (%)	1(0.8)	3(2.43)	3(1.76)	2(1.17)
34-48 n (%)	30(24.39)	4(3025)	45(26.47)	2 (1.76)
49-63 n (%)	49(39.83)	13(10.56)	92(54.11)*	8 (4.70)
64-78 n (%)	19(15.44)	4(3.25)	14(8.23)	4 (2.35)

MS: Metabolic Syndrome

*P value less than 0.05 was considered significant.

Table 4: Number of Type 2 diabetic subjects accomplishing the criteria of metabolic syndrome

Parameters	Males(n=123)	Females(n=170)
3 criteria n (%)	36 (29.26)	51(30)
4 criteria n (%)	45(36.58)	81(47.64)
5 criteria n (%)	18(14.63)	22(12.94)
Total criteria n (%)	99(80.48)	154(90.58)

76.42% subjects had low serum HDL-cholesterol and abdominal obesity for males and females, respectively (P<0.05).There were no significant differences in males and females type 2 diabetic patient's fast blood sugar, blood pressure and triglyceride. According to ATPIII, in male and female subjects, the frequency of metabolic syndrome was 80.48% and 90.58%, respectively (P<0.05). Our study result shows that the prevalence of metabolic syndrome was higher in females in this area. The prevalence of abdominal obesity was the most frequent in type 2 diabetic subjects in both genders. Female's type 2 diabetic subjects had a higher prevalence of abdominal obesity (93.52%) and low serum HDL-cholesterol (67.05%)

than male diabetic subjects. Thus, abdominal obesity is the most important metabolic syndrome component for both genders. Females were more affected. Table 2 shows the distribution of type 2 diabetic subjects according to gender and age. The most age distribution in both genders was in ages between 34-48 and 49-63 years. Table 3 shows Type 2 diabetic subjects with and without metabolic syndrome by gender and age. There was increased frequency of metabolic syndrome from age 34-63 years in male and female subjects. According to ATP III diagnostic criteria, the frequency of metabolic syndrome in age 49-63 in female subjects were higher than male (P<0.05). The prevalence of metabolic syndrome was high in ages 34-48 and 49-63 years in both genders when compared with other age groups. There were no significant differences in subjects with metabolic syndrome in other age groups. Table 4 shows number of Type 2 diabetic subjects accomplishing the criteria of metabolic syndrome. According to ATP III diagnostic criteria, 29.26%, 36.58% and 14.63% males and 30%, 47.64% and 12.94% females had three, four and five criteria for metabolic syndrome, respectively.

DISCUSSION

There is increasing prevalence of the metabolic syndrome whole around the world. This maybe takes place due to the fact of elevation of obesity worldwide [19]. The metabolic syndrome is described by a several metabolic risk factors, such as high fast blood sugar, high blood pressure, high triglyceride, abdominal obesity and low HDL-cholesterol [20].The mentioned risk factors has been reported in high frequency in Asian populations without regard to their geographic places [21]. In this study, the prevalence of metabolic syndrome was higher in females than males in ages 49-63 years which is different with other study [22]. Incidence of metabolic syndrome increases as age progresses. In a study in Turkey, the prevalence of the metabolic syndrome was 15.3%, 23.1%, 28.0%, 26.0% and 20.5% among people aged from 30 to 39, 40 to 49, 50 to 59, 60 to 69, 70 to 79 and = 80 years old, respectively [23]. Study in Norway showed that prevalence of the metabolic syndrome elevated with age into the ninth decade of life [24]. Study of Ford showed that the prevalence of the metabolic syndrome was16.5%, 40.3% and 46.4% for males and 19.1%, 33.8% and 56.0%, respectively, for females among US people

aged from 20 to 39, 40 to 59 and = 60 years old, respectively. There was an association between older age groups and a higher prevalence of metabolic syndrome [25]. Park *et al*. showed that there was an increase in prevalence of the metabolic syndrome from 20 years old through the sixth and seventh decade of life for males and females, respectively. World Health organization predicts the prevalence of obesity to be 4.8%, 17.1% and 20% in less developed, developing and developed countries, respectively [26]. As reported in the year 1991, 53% males and 44% females were obese in United Kingdom [27]. In this study, 86.34% of patients over the age 34 years had metabolic syndrome. High blood pressure was higher in males than in females and High triglyceride was the same in both genders. Low HDL cholesterol and abdominal obesity were higher in females than in males. Abdominal obesity was the first abnormality in type 2 diabetes mellitus in both genders. The prevalence of obesity is increasing in developed, developing and less developing countries [22]. Type 2 diabetic obesity is increasing in most western and Asian countries [28]. Therefore, obesity may play a main role in causing metabolic syndrome.

Conclusion This study showed a high prevalence of the metabolic syndrome in type 2 diabetic populations. Females were more affected than males. This may be due to the specific characteristics in the lifestyle changes between females and males diabetic patients among Gorgan inhabitants. Females type 2 diabetic patients are less educated in comparison with the males diabetic. The majority of females with metabolic syndrome were householder. It seems that they do less physical activity at home. In Iran, females in general do less physical activity (especially less educated females) and overweight and obesity were more perceived between them. In conclusion, it appears that the female type 2 diabetic patients need to change their life style in this area to halt the burden of cardiovascular complications in type 2 diabetic patients.

ACKNOWLEDGEMENT

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