JOURNAL OF PHARMACEUTICAL AND BIOMEDICAL SCIENCES

Marjani Abdoljalal et al. **Age related metabolic syndrome among Fars ethnic women in Gorgan, Iran.** *Journal of pharmaceutical and biomedical sciences (J Pharm Biomed Sci.)* 2013, May; 30(30): 929-935. (Article no 09)

PBMS
ournal of Pharmaceutical and Biomedical Sciences

ISSN NO- 2230 – 7885
CODEN JPBSCT
NLM Title: J Pharm Biomed Sci.

Marjani Abdoljalal et al. *J Pharm Biomed Sci.* 2013, May; 30 (30): 929-935.
Available at jpbms.info

Original article

Age related metabolic syndrome among Fars ethnic women in Gorgan, Iran.

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Abstract:

Background: Studies have been shown that the prevalence of metabolic syndrome changes among different ethnic and sex groups. *Objective:* We determined age related prevalence of metabolic syndrome among Fars ethnic women. *Study design:* Health center based study. *Setting:* Metabolic Disorders Research Center in Gorgan. *Participants:* 160 Fars adult women. *Sampling:* randomized sampling method. *Results:* The most age distribution was in ages from 35 to 40 years (50%). There were significant differences between the mean value of waist circumferences, fasting blood glucose, body mass index and triglyceride among subjects with and without metabolic syndrome in age groups 20-24 and 25-29 years old (P<0.05). HDL-cholesterol and LDL-cholesterol levels were significantly decreased and increased in these age groups, respectively (P<0.05). There were also significant increases in fasting blood glucose and triglyceride levels among subjects with and without metabolic syndrome in age groups 30-34 and 35-40 years old (P<0.05). There were decreased HDL-cholesterol in age group 30-34 years old (P<0.05). There were significant differences in the prevalence of metabolic syndrome in age groups 20-24 and 30-34 years old (P<0.05).

Conclusion: High waist circumference, Fasting Glucose and triglyceride, and low HDL cholesterol are more effective among subjects with metabolic syndrome and, in the presence of obesity may elevate the risk of coronary heart disease. The increasing number of overweight and obese subjects in our study makes certain that metabolic syndrome begins from young age and will continue as age progresses. It seems that women require altering their life style to prevent cardiovascular complications.

Keywords: Gorgan, metabolic syndrome, age related, ethnic group.

Introduction:

The prevalence of the metabolic syndrome increases whole around the world. The metabolic syndrome is described by the clustering of hypertension, dyslipidaemia, central obesity, insulin resistance and high fasting plasma glucose[1]. In 1923, metabolic syndrome was explained for the first time by Kyln[2].Gerald Reaven re-exhibited the concept of metabolic syndrome in 1988. He has been shown that metabolic syndrome is the clustering of hypertension, glucose intolerance; high triglycerides and low high density lipoprotein (HDL) concentration[3].Studies have been shown that the prevalence of metabolic syndrome changes among different ethnic groups[4-6]. The genetically differences, nutritional regiment, physical exercise, age and gender may affect the prevalence of metabolic syndrome and its components[7]. Many studies have indicated that the prevalence of metabolic syndrome changes worldwide 8-24% and 7-46.5% among men and women, respectively[8-11]. The main causes of death among women are cardiovascular disease[12]. Many epidemiological studies have indicated the importance of the metabolic syndrome[13-15]. It has been shown that the metabolic syndrome causes health problem in developed and developing countries. The prevalence of metabolic syndrome in Europe and European Americans vary nearly 20%-30% in men and women [4, 7, 9 , 16-17]. It has been also revealed that the prevalence of metabolic syndrome is elevating in Asian countries[18]. It was reported that the prevalence of metabolic syndrome is the similar for men (24%) and women (23.7%) in the US, but there was an ethnic differences in the prevalence of metabolic syndrome[9].There are a few studies on the prevalence of the metabolic syndrome among adult

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ournal of Pharmaceutical and Biomedical Sciences

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Available at jpbms.info

people. It has been indicated that the prevalence of the metabolic syndrome among 15 (in Japan), 12-19 (in the United States), 10-18 (in Mexico), 10-19 (in Iran) [19-22] and 12-19 (US black) years old were 1%, 6.4%, 6.5%, 10% and 4%, respectively[23]. In present study, we determined age related prevalence of the metabolic syndrome among Fars ethnic women in this area (Gorgan, North East of Caspian Sea).

Materials and methods:

This present study was carried out in the Metabolic Disorders Research Center in Gorgan. 160 Fars adult females were took part (Women who speak only Persian language) that was directed to the Health Centers in Gorgan. Demographic data is collected by a questionnaire. Women with hormone replacement therapy, taking anti-diabetes and anti-hypertensive anti-lipidemic agents and active smokers were excluded. A blood sample was collected after 8-12-hours fasting. Fasting blood glucose, triglycerides, total cholesterol, LDL-cholesterol and HDL-cholesterol levels were determined in serum of all subjects. Commercial kits and spectrophotometer techniques (Model JENWAY 6105 UV / VIS) were used to assess these biochemical parameters in the Metabolic Disorders Research Center. Metabolic syndrome among women was considered if any of subjects had 3 or more of the following ATP III Criteria [24]:

1. Serum glucose level higher than 110 mg/dl.
2. Low HDL-cholesterol lower than 50 mg/dl.
3. Serum triglycerides level higher than 150 mg/dl.
4. Systolic Blood Pressure (SBP) higher than 130 mmHg and/or Diastolic Blood Pressure (DBP) higher than 85 mmHg (Hypertension).
5. Waist Circumference higher than 88 cm (Abdominal obesity).
6.

Weight was measured with minimal clothed, using digital scales. Height was measured with tape meter when the shoulder was in a normal position. Calculation of body mass index (BMI) was done when weight in kilograms divided by height in meters squared. BMI with 25.0-29.9 Kg/m^2 were arranged as overweight. Subjects with a BMI greater than 30 Kg/m^2 and 45 Kg/m^2 were specified as obese and very obese, respectively[25]. Abdominal obesity was assessed at the point halfway between the lower border of ribs and the iliac crest in a horizontal plane[26]. Blood pressure was determined in sitting position from the right hand. The results were reported in percentages and mean value. SPSS- 16 version software was used to analyze the data. Independent student t test was used to evaluate the results. P- Value lower than 0.05 was considered statistical significant.

Results:

160 Fars females were included in this study. The mean age of women was 53.65±9.50 years (the age range was 20-40 years old). The mean waist circumferences, fasting blood glucose, triglyceride, HDL-cholesterol, LDL-cholesterol levels, systolic blood pressure, diastolic blood pressure and body mass index were shown in table 1 according to age distribution among Fars ethnic group. There were no significant differences between all parameters in different age groups. The mean waist circumferences increased from age 25 to 40 years old. The mean HDL-cholesterol decreased in all age groups. Table 2 shows distribution of metabolic syndrome components among subjects with and without metabolic syndrome according to age group. The most age distribution was in ages from 35 to 40 years (50%). There were significant differences between the mean value of waist circumferences, fasting blood glucose, body mass index and triglyceride among subjects with and without metabolic syndrome in age groups 20-24 and 25-29 years old ($P<0.05$). The mean HDL-cholesterol and LDL-cholesterol levels were significantly decreased and increased in these age groups, respectively ($P<0.05$). There were also significant increases in fasting blood glucose and triglyceride levels among subjects with and without metabolic syndrome in age groups 30-34 and 35-40 years old ($P<0.05$). There were decreased HDL-cholesterol in age group 30-34 years old ($P<0.05$). There were no significant differences between other parameters in subjects with and without metabolic syndrome in different age groups ($P>0.05$). There were significant differences in the prevalence of metabolic syndrome in age groups 20-24 and 30-34 years old ($P<0.05$).

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Available at jpbms.info

Table 1. Distribution of metabolic syndrome components according to age group.

Age group (year) Parameters	20- 24	25 - 29	30 - 34	35 - 40
WC (mg/dl)	86.82±13.47	90.46±13.47	97.95±11.27	96.28±12.99
FG (mg/dl)	101.77±85.15	92.24±43.36	98.87±54.43	109.03±75.81
BMI (kg/m2)	24.22±4.43	25.50±4.95	28.36±5.86	27.98±5.23
SBP (mmHg)	107.61±11.38	112.33±11.94	112.50±18.31	115.91±14.97
DBP(mmHg)	67.60±9.82	70.80±8.27	68.25±13.30	70.67±10.90
TG(mg/dl)	97.67±42.52	122.0±113.68	131.75±75.41	111.05±58.89
HDL- chol (mg/dl)	43.45±11.88	43.98±14.54	40.61±10.27	45.39±14.0
LDL- chol (mg/dl)	110.42±39.92	117.59±49.89	119.34±34.85	117.45±36.82
Total n (%)	28(17.50)	30(18.75)	20(12.5)	82(51.25)

WC: Waist Circumferences, FG: Fasting Glucose, BMI: Body Mass Index, SBP: Systolic Blood Pressure, DBP: Diastolic Blood Pressure, TG: triglyceride, HDL-chol: HDL-cholesterol and LDL-chol: LDL-cholesterol. P>0.05

Table 2. Distribution of metabolic syndrome components in subjects with and without metabolic syndrome according to age group

Age group (year)	20 – 24		25 – 29		30 – 34		35 – 40	
Parameter	**MS**	**WMS**	**MS**	**WMS**	**MS**	**WMS**	**MS**	**WMS**
WC (mg/dl)	100.33±9.81*	85.20±8.32	107.67±5.46*	86.16±11.22	103.14±5.58	96.06±13.99	94.97±9.41	96.62±13.81
FG(mg/dl)	244.37±249.39*	84.65±11.31	129.12±90.25*	83.02±12.51	125.0±86.95*	88.90±19.04	176.38±116.70*	91.42±48.48
BMI (kg/m^2)	31.29±9.40*	23.37±2.79	30.87±5.57*	24.15±3.84	30.03±4.50	28.27±6.81	26.66±4.52	28.32±5.38
SBP (mmHg)	123.33±5.77	105.72±10.41	123.33±8.16	109.58±11.22	118.57±21.93	110.62±15.69	110.59±12.97	117.31±15.23
DBP (mmHg)	73.33±15.27	66.92±9.20	69.16±4.91	71.20±8.95	67.85±16.29	69.37±11.23	70.0±10.0	70.84±11.20
TG(mg/dl)	173.67±31.26*	88.56±33.83	324.67±93.65*	71.33±31.57	212.86±72.60*	86.0±23.96	186.65±60.30*	91.27±39.56
HDL- chol (mg/dl)	28.73±51.14*	45.21±11.19	49.50±26.82	42.60±10.03	33.71±7.36*	45.88±9.51	37.85±14.27*	47.36±13.35
LDL- chol (mg/dl)	100.93±51.19	111.56±39.52	136.65±61.75*	112.84±46.82	111.71±25.86	128.55±38.93	119.02±20.92	117.04±40.07

WC: Waist Circumferences, FG: Fasting Glucose, BMI: Body Mass Index, SBP: Systolic Blood Pressure, DBP: Diastolic Blood Pressure, TG: triglyceride, HDL-chol: HDL-cholesterol and LDL-chol: LDL-cholesterol. MS: Metabolic Syndrome, WMS: Without Metabolic Syndrome.*P<0.05.

Discussion:

The results of present study indicated that metabolic syndrome components increased as age progresses. Waist circumference and HDL-cholesterol (Lower than 50 mg/dl) were increased and decreased among different age groups, respectively (Table 1). Many studies have revealed that metabolic syndrome is more common in women than men[27]. Kazan et al. indicated that the prevalence elevated as age increased in women than men[28]. Sex seems to have an important role in elevation of prevalence of risk factors like obesity, high lipid levels and low HDL cholesterol level among females[29]. Our study has been shown that Waist

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Available at jpbms.info

circumference and BMI increased form age 25 to 40 years old (Table 1). Some other studies have shown that women in different age groups indicated higher waist circumference and blood glucose and low HDL cholesterol when compared to males[30]. This means that sex and age have an important effect on the prevalence of cardiovascular risk factors in subjects with metabolic syndrome. Study in Turkey showed that the prevalence of metabolic syndrome increased from ages 30 to 80 years old[31]. Study of Ford revealed that the prevalence was elevated for women among US people aged from 20 to 60 years old. They have shown that there was an association between a higher prevalence of metabolic syndrome and older age groups[32]. Study of Park et al. indicated that the prevalence of the metabolic syndrome increases among women from ages 20 to 70 years old[33]. Although age-related differences in the mean value of metabolic syndrome components were not significant overall in different age groups, but they were significant for the components of high fasting glucose, high triglyceride (significant in all age groups) and high waist circumference (significant in age groups 20-24 and 25-29 years old) among women with metabolic syndrome. Our study has been shown that Hyperglycemia, hypertriglceridemia, high waist circumference and low HDL cholesterol were particularly common amongst the woman subjects. The present study indicated that the most metabolic syndrome components found in age group 20-24 years old (4 components of metabolic syndrome). This means that young people is particularly of interest, due to the fact that the risk of cardiovascular disease elevates as age progresses. Study has revealed that the causes of metabolic syndrome are associated with obesity, lack of physical activity, high LDL-cholesterol diets, aging and genetic factors[34]. Studies have shown that low HDL cholesterol was seen among females with metabolic syndrome[35-36].

Many studies have revealed that obesity is accompanied with waist circumference greater than 88 cm which is a significant prognosis for CVD in different age groups[37-39]. It has been shown that Obesity, glucose metabolism abnormality, hypertension and dyslipidemia are known as a risk factor for CVD leading to fatal outcome. These risk factors are the components of metabolic syndrome, therefore it is important to determine the components of metabolic syndrome to prevent the early onset of CVD [40-42]. Study among US women younger than 50 years have been shown that the annual death rate from CVD is more than breast cancer[43]. In other studies in the United States have indicated that the epidemiological increase of overweight and obesity is associated with an elevated prevalence of early onset CVD and type 2 diabetes mellitus[44-45]. Studies have shown that these epidemic changes may in relation with lifestyles alterations[46,47]. Abdominal obesity was the common metabolic syndrome component in our study groups which is in agreement with other study groups in the United States[48]. It has been shown that there is an association between the metabolic syndrome and elevation of age and BMI[33,49-50]. Other studies have indicated that BMI and age are the most important predictors of metabolic syndrome for women and men[48]. Studies among different populations indicated that waist circumference alone[51] or with body mass index[52] is a good predictors for type 2 diabetes mellitus. Report of a WHO Expert Committee revealed that waist circumference is the most effective and easiest anthropometric index to be utilized for measurement of fatness and fat location [53]. Study of Ford et al.[38] indicated that waist circumference is a better predictor than body mass index of the metabolic syndrome, diabetes, cardiovascular disease. There is a relationship between abdominal obesity and the elevation of portal free fatty acid levels which causes hyperinsulinemia[54-55]. The hyperinsulinemia is associated with cardiovascular disease risk factors[56]. In our study the mean BMI varied from 24.22±4.43 kg/m^2 to 28.36±5.86 kg/m^2, which is the same to women in northeastern Iran, Golestan Province (28.6 kg/m^2)[57]. Women in our study group were overweight and obese. The most females with metabolic syndrome were obese. Obesity is associated with the elevation of the risk of dyslipidemia, type 2 diabetes mellitus and hypertension. Obesity is an important predictor of coronary heart and cardiovascular disease[58].

Low HDL-cholesterol level is associated with increased serum triglycerides and remnant lipoproteins[59-60]. There are association between low HDL cholesterol and high LDL-cholesterol level[61]. Low HDL-cholesterol level is associated with insulin resistance and metabolic risk factors[62]. Our results indicates that the mean value of HDL cholesterol in our study group were lower than 50

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mg/dl. There are contrary relationship between high HDL cholesterol and the decreased risk of coronary heart disease [63].

Conclusion:

High waist circumference, Fasting Glucose and triglyceride, and low HDL cholesterol are more effective among subjects with metabolic syndrome and, in the presence of obesity may elevate the risk of coronary heart disease. The increasing number of overweight and obese subjects in our study makes certain that the metabolic syndrome begins from young age and will continue as age progresses. It seems that women require altering their life style to prevent cardiovascular complications.

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PBMS
ournal of Pharmaceutical and Biomedical Sciences

ISSN NO- 2230 – 7885
CODEN JPBSCT
NLM Title: J Pharm Biomed Sci.

Marjani Abdoljalal et al. *J Pharm Biomed Sci.* 2013, May; 30 (30): 929-935.
Available at jpbms.info

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Conflict of interest: - **Author has not declared any conflict of interest.**

Source of funding: - **None.**

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