

# Prevalence of Metabolic Syndrome in Turkmen Ethnic Groups in Gorgan

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## ABSTRACT

**Introduction:** It has been estimated that the metabolic syndrome may predict cardiovascular disease and the occurrence of sudden death, independent of the presence of other cardiovascular risk factors. The aim of the present study was to assess the metabolic syndrome among Turkmen women in this area.

**Material and Methods:** The present study consisted of 160 Turkmen women. Baseline data and prevalence of metabolic syndrome and the components of metabolic syndrome in Turkmen women were determined.

**Observations and Results:** The prevalence of high levels of fasting glucose, low levels of high density lipoprotein-cholesterol, high triglyceride levels, high waist circumference

and high blood pressure were shown to be 29.37%, 70.62%, 35.62%, 75% and 26.25%, respectively. It was shown that high waist circumference (75%) and Low HDL-cholesterol levels (70.62%) were the most frequent characteristics in comparison to other metabolic components. The prevalence of high waist circumference, high triglyceride levels, high levels of fasting glucose, high blood pressure and BMIs which were  $\geq 25$  were higher in subjects with metabolic syndrome (92.85%, 73.21%, 73.21%, 57.14% and 83.92%, respectively).

**Conclusion:** Metabolic syndrome is more prevalent among Turkmen women. Our data has shown that the prevalence of abnormal waist circumference in this ethnic group was highest. The waist circumference can be used as a predictor for cardiovascular disease and coronary heart disease.

**Key words:** Metabolic syndrome, Turkmen, Gorgan

## INTRODUCTION

Insulin resistance syndrome or metabolic syndrome is characterized by obesity, glucose intolerance, hypertension, and dyslipidaemia [1]. The pathogenesis of the metabolic syndrome is not completely known. Some factors such as sedentary lifestyles and dietary habits cause to develop this syndrome [2]. Some studies have shown that there was an association between the metabolic syndrome and diabetes, cardiovascular disease, and mortality [3]. It has been estimated that the metabolic syndrome may predict cardiovascular disease and, the occurrence of sudden death, independent of the presence of other cardiovascular risk factors and the incidence and progression of carotid atherosclerosis [4]. It has been reported that worldwide prevalence of metabolic syndrome changes ranged from <10% to 84%. It depends on age, region, urban or rural environment, ethnicity, and the interpretation of metabolic syndrome used [5]. A number of large prospective epidemiologic studies have been confirmed the importance of the metabolic syndrome as a predictor of vascular disease in general populations as a predictor of vascular disease [6]. The metabolic syndrome has become common in the United States [7]. In developed and developing countries, the metabolic syndrome is an important public health problem. The prevalence of metabolic syndrome in Europe and among European Americans ethnic groups change nearly from 20% to 30%, in males and females [7-8]. Some studies have shown that there was an increasing prevalence of metabolic syndrome in Asia [9]. In our area, there are no data on metabolic syndrome in ethnic Turkmen ethnic women metabolic syndrome in Gorgan (south east of Caspian Sea), Iran. The aim of present study was to assess the metabolic syndrome among Turkmen women in this area.

## MATERIAL AND METHODS

The present study consisted obtained 160 Turkmen women who spoke Turkmen language (As a native language). They were referred to the different Health Centers in Gorgan. A questionnaire

was completed at each Health Centers by trained interviewers and data were collected. Weight was measured in kilograms with the women being minimally clothed and by using digital scales. Height was measured in centimeters with women in standing position, while their shoulders were in a normal positions. Body mass index (BMI) was calculated as weight in kilograms, divided by height in meters, squared. Women with BMIs of 25.0–29.9 Kg/m<sup>2</sup>,  $\geq 30$  Kg/m<sup>2</sup> and  $\geq 45$  Kg/m<sup>2</sup> were classified as overweight, obese and very obese, respectively [10]. Waist circumference was measured at the point which was halfway between the lower border of ribs and the iliac crest in a horizontal plane by using a tape meter [11]. A Venous blood samples were as collected from all the subjects after an overnight fast for 8–12 hours an overnight fast. The collected samples were centrifuged for 10 minutes at 3000 rpm and the serum were as separated. The serum levels of fasting blood glucose, triglycerides, total cholesterol and HDL-cholesterol concentrations were measured by using a biochemical kit and using spectrophotometer techniques in the 5<sup>th</sup> Azar Educational Hospital, Faculty of Medicine). LDL cholesterol was calculated by using the Friedewald equation. Systolic and diastolic blood pressures were measured by using a standard mercury manometer with women in sitting position, from their right hands. Systolic and diastolic blood pressures were calculated as the means of the two measurements. Hypertension was diagnosed when systolic blood pressure was  $\geq 135$  mm Hg and/or diastolic blood pressure was  $\geq 85$  mm Hg. Turkmen women were considered to have metabolic syndrome if they had any three or more of the following, according to the ATP III Criteria [12].

**Abdominal obesity:** A Waist Circumference of >88 cm, Hypertriglyceridaemia: a serum triglycerides level of > 150 mg/dl, Low HDL-cholesterol: < 50 mg/dl, High blood pressure: SBP  $\rightarrow$  130 mmHg and/or DBP  $\rightarrow$  85 mmHg or those who were on treatment for hypertension and High fasting glucose: a serum glucose level of  $\geq 110$  mg/dl or on treatment for diabetes. The results were reported as percentages and mean  $\pm$ SD. The statistical analysis was done with

by using SPSS software, version - 16 version software. Independent student 't' and Chi-square tests were used for evaluation of results. Statistical significance was considered at a p value of < 0.05.

## RESULTS

The mean age of subjects was  $32.33 \pm 137.08$  years, and mean BMI was  $27.92 \pm 6.28$  kg/m<sup>2</sup>. 35% (56/ 160) and 65% (104/160) of women were diagnosed as having and not having the metabolic syndrome, respectively. [Table/Fig-1] shows the baseline data of the subjects with and without the metabolic syndrome. The mean body mass index, waist circumference, systolic blood pressure, diastolic blood pressure, triglyceride, cholesterol and fasting blood glucose levels were significantly higher in the subjects with metabolic syndrome ( $p < 0.001$ ). [Table/Fig-2] shows the prevalence of metabolic syndrome and the components of metabolic syndrome in Turkmen women. The prevalence of high fasting glucose levels, low high density lipoprotein-cholesterol levels, high triglyceride levels, high waist circumference and high blood pressure were shown to be 29.37%, 70.62%, 35.62%, 75% and 26.25%, respectively. It has been shown that a high waist circumference (75%) and Low HDL-cholesterol levels (70.62%) were the most frequent characteristics in comparison to other metabolic components. [Table/Fig-3] shows the characteristics of Turkmen women according to incidence of metabolic syndrome. The prevalence of a high waist circumference, high triglyceride levels, high fasting glucose levels, high blood pressure and BMIs which were  $\geq 25$  were higher in subjects with metabolic syndrome (92.85%, 73.21%, 73.21%, 57.14% and 83.92%, respectively). [Table/Fig-4] shows the prevalence of one or more components of the metabolic syndrome. The results of this study showed that 26.86%, 38.12%, 17.50, 14.37% and 3.12% women had one, two, three, four and five criteria of metabolic syndrome components, respectively.

Parameters	Total number of subjects	Subjects with metabolic syndrome	Subjects without metabolic syndrome	p-value
All women, No.(%)	160 (100)	56 (35)	104 (65)	-
Age (years)	$32.33 \pm 7.08$	$33.64 \pm 6.80$	$31.63 \pm 7.17$	0.083
Height, Cm	$156.73 \pm 9.73$	$159.86 \pm 8.35$	$158.13 \pm 10.38$	0.255
Weight, Kg	$69.48 \pm 15.36$	$76.71 \pm 15.35$	$65.54 \pm 14.02$	<0.0001
BMI, kg/ m <sup>2</sup>	$27.92 \pm 6.28$	$30.31 \pm 6.08$	$26.62 \pm 6.01$	<0.0001
WC, cm	$95.59 \pm 11.97$	$100.50 \pm 11.93$	$92.95 \pm 11.18$	<0.0001
SBP, mmHg	$122.90 \pm 20.72$	$137.54 \pm 23.25$	$115.02 \pm 13.97$	<0.0001
DBP, mmHg	$77.80 \pm 10.73$	$82.94 \pm 9.69$	$75.02 \pm 10.27$	<0.0001
FBS, mg/dl	$112.65 \pm 51.0$	$153.43 \pm 58.52$	$90.68 \pm 28.18$	<0.0001
TG, mg/dl	$141.28 \pm 94.98$	$202.93 \pm 125.72$	$108.08 \pm 48.02$	<0.0001
T-CHOL, mg/dl	$172.42 \pm 53.03$	$189.30 \pm 63.42$	$163.34 \pm 44.22$	<0.0001
HDL-CHOL, mg/dl	$43.93 \pm 14.62$	$43.01 \pm 17.61$	$44.43 \pm 12.79$	0.594
LDL-CHOL, mg/dl	$124.47 \pm 38.46$	$130.31 \pm 47.62$	$121.33 \pm 32.31$	0.210

**[Table/Fig-1]:** Baseline data of Turkmen women

BMI: Body mass index, WC: waist circumference, SBP: systolic blood pressure, DBP: diastolic blood pressure, FBS: fasting blood glucose, TG: triglyceride, T-CHOL: total cholesterol, HDL-CHOL: HDL-cholesterol and LDL-CHOL: LDL-cholesterol. (\*p value less than 0.05 was considered significant)

## DISCUSSION

Metabolic syndrome is an important healthcare problem and its prevalence is rising worldwide. The prevalence of metabolic syndrome changes significantly in different parts of the world and in the same country. The global prevalence of metabolic syndrome among women alters ranges from 7.0% to 56.7% [13]. This difference could be due to variations in lifestyle and nutritional habits among women in different regions. Some studies have shown that the prevalence of metabolic syndrome in Asia was lower than that in developed countries [7-8]. The prevalence of

metabolic syndrome is increasing in developing countries. It has been shown that prevalences of metabolic syndrome in Philippines, Malaysia, India, Turkey, Iran, Venezuela and Brazil were 19%, 24.2%, 28.8%, 33.4%, 33.7%, 31.2% and 25.4%, respectively [14]. Studies which were done on Korean and Taiwanese populations have shown that the prevalences of metabolic syndrome for in women were 31.9% and 36.6% [15]. Studies have shown that the prevalence of metabolic syndrome among rural women was 31.25% in Bangladesh and that it was 36.4% in India [16-17]. The prevalence of the metabolic syndrome in this study was 35.0%. The high prevalence of metabolic syndrome in Turkmen women was almost in agreement with those of Indian (36.4%) and Taiwanese (36.6%) populations [17]. Differences in the prevalence of metabolic syndrome may depend on age distribution, socioeconomic or nutritional statuses and different ethnic groups. Several studies have suggested that physical activity and moderate drinking were protective factors and that a family history of diabetes; hypertension and cardiovascular disease and cigarette smoking were risk factors of developing metabolic syndrome among populations of developing countries populations [18]. Overweight and elevated waist circumferences were very common in our study. According to this study, 49.37% of women were overweight and 75% were centrally obese.

Parameters	Number	%
Metabolic syndrome	56	35
BMI $\geq 25$	79	49.37
Fasting Blood Sugar >110 mg/dl	47	29.37
High Density Lipoprotein-cholesterol < 50 mg/dl	113	70.62
Triglyceride > 150 mg/dl	57	35.62
Waist circumference > 88 cm	120	75
Systolic blood pressure >130 mmHg/ Diastolic blood pressure >85 mmHg	42	26.25

**[Table/Fig-2]:** Prevalence of metabolic syndrome and the components of metabolic syndrome in Turkmen women (n=160)

Parameters	Subjects with MS (n=56) n (%)	Subjects without MS (n=104) n (%)	p-value
Parameters	n (%)	n (%)	
BMI $\geq 25$	47(83.92)*	32(30.18)	<0.0001
WC > 88 cm	52(92.85)*	68(65.38)	<0.0001
SBP >130 mmHg/ DBP >85 mmHg	32(57.14)*	10(9.61)	<0.0001
FBS >110 mg/dl	41(73.21)*	6(5.76)	<0.0001
TG > 150 mg/dl	41(73.21)*	16(15.38)	<0.0001
HDL-Chol < 50 mg/dl	44(78.57)	69(66.34)	0.361

**[Table/Fig-3]:** The characteristics of Turkmen women according to incidence of metabolic syndrome

MS: Metabolic Syndrome. BMI: Body mass index, WC: waist circumference, SBP: systolic blood pressure, DBP: diastolic blood pressure, FBS: fasting blood glucose, TG: triglyceride, HDL-CHOL: HDL-cholesterol.

\*p value less than 0.05 was considered significant

Parameters	Subjects (n=160)
1 Criteria n (%)	43 (26.87)
2 Criteria n (%)	61 (38.12)
3 Criteria n (%)	28 (17.50)
4 Criteria n (%)	23 (14.37)
5 Criteria n (%)	5 (3.12)
Metabolic Syndrome n (%)	56 (35)

**[Table/Fig-4]:** Number of subjects performing the criteria of metabolic syndrome components

Some studies have shown that an association between abdominal obesity and an elevation in portal free fatty acid levels leads to hyperinsulinaemia [19]. Hyperinsulinaemia is one of cardiovascular disease risk factors [20]. One of possible explanations for the higher prevalence of metabolic syndrome is abdominal obesity.

The waist circumference reflects abdominal fat (as an index of abdominal obesity) [21]. It is a predictor for cardiovascular disease [22]. The present study showed that 75% of women had a high waist circumferences. Some studies have shown a relationship between serum triglyceride levels and prevalence of coronary heart disease. Thus, increased serum triglycerides help to in predicting women who are at risk [23]. In this study, 78.57% of women had triglyceride levels which were >150 mg/dl. Some studies have shown that a low HDL-cholesterol levels were associated with elevated levels of serum triglycerides and high LDL-cholesterol [24]. A Low HDL-cholesterol levels can be associated with metabolic risk factors. Results of this study showed that the prevalence of low HDL cholesterol in Turkmen women with metabolic syndrome was 78.57%, which was higher than that which was seen in adult women who were included in a Tehran study (36%) [25]. A study suggested that low HDL cholesterol was associated with an increased risk for coronary heart disease [26]. Some studies have reported that there was an association between high blood pressure and a risk for coronary heart disease [27]. In our study, the prevalence of hypertension in Turkmen women with metabolic syndrome was 57.14%. Our results were as not in agreement with those of the Tehran study in (Tehran 23.3%), Isfahan 19.4% in 1999 [28] and 18.8% in 2004 [29], France (22.2%) [30] and Korea (25.9%) [31]. These differences may depend on many factors like genetic origin, insulin resistance and environmental factors [32].

## CONCLUSION

Metabolic syndrome has become more prevalent among Turkmen women. Our data has shown that the prevalence of abnormal waist circumferences in this ethnic group was highest. The waist circumference may be used as a predictor for cardiovascular disease and coronary heart disease. Further studies including which have bigger sample sizes are required, to potentially focus on such issues.

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