

# Age Related Metabolic Syndrome Among Hemodialysis Patients in Gorgan, Iran

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**Abstract:** People with metabolic syndrome are at high risk for developing cardiovascular disease. The present study aimed to determine the age related metabolic syndrome of hemodialysis patients. The biochemical parameters and demographic information were registered. The prevalence of metabolic syndrome was significantly high in ages 50-59 and 60-69 years in hemodialysis patients when compared with other age groups ( $P < 0.05$ ). There was elevated frequency of metabolic syndrome from age 50-59 and 40-49 years in male and female hemodialysis patients, respectively. The frequency of metabolic syndrome in female subjects (65.27%) was higher than male (47.14%,  $P < 0.05$ ). The prevalence of metabolic syndrome was high in ages 50-59 years in males and females. There was a significant difference in hemodialysis patients with metabolic syndrome in ages 50-59 years in males and from ages 40-49, 50-59 and 60-69 years in females ( $P < 0.05$ ). Our results show that 25.71%, 18.57% and 2.86% males and 36.11%, 20.83% and 8.33% females had three, four and five criteria for metabolic syndrome, respectively. The results of this study showed that females patients were more affected than males. This may depend on the specific lifestyle alterations among females and males patients in this area.

**Keywords:** Gorgan, metabolic syndrome, hemodialysis, age.

## INTRODUCTION

Metabolic syndrome (MS) is a complex disorder that was first described by Reaven in 1988 [1]. The characteristics of metabolic syndrome are abdominal obesity, hypertriglyceridemia, low high-density lipoprotein cholesterol levels, high blood pressure, and high fasting blood glucose levels. Age is an important factor in the incidence of metabolic syndrome in males and females, according to the National Health and Nutrition Examination Survey 1999-2000 [2]. Metabolic syndrome forms a major health problem in Western countries. It may affect almost 20% of the adult population and 40% of adults over 60 years old [3]. The age-adjusted prevalence of metabolic syndrome showed an increased incidence among females (23.5%) and males (2.2%) in the United States during the periods 1988-1994 and 1999-2000. It has been reported that the incidence of metabolic syndrome change meaningfully among different ethnic groups [4]. Many studies have shown that metabolic syndrome is an important risk factor for some disease such as cardiovascular disease, chronic kidney disease (CKD) and death among people [5-9]. The prevalence of metabolic syndrome among renal transplant recipients has indicated to be from 38.6% to 63.4% [10, 11]. Data from the Third

National Health and Nutrition Examination Survey (NHANES III) has shown that 23.7% US residents aged 20 years and older have metabolic syndrome [12]. Study of Gu *et al.* [13] showed that 15.1% of Chinese adults aged 35 to 74 years have metabolic syndrome. Young and coworkers showed that the incidence of metabolic syndrome was up to 70% in hemodialysis patients [14]. They have indicated that metabolic syndrome was more prevalent among diabetic, female, and white end-stage renal disease patients. In our area, we do not have enough information about age related metabolic syndrome among hemodialysis patients. The present study aimed to determine the age related metabolic syndrome of hemodialysis patients in Gorgan, Golestan province (South East of Caspian Sea), Iran.

## MATERIALS AND METHODS

This cross sectional study was done on hemodialysis patients who were referred to 5th Azar Educational Hospital, Dialysis Center (The only Educational Dialysis Center) in Gorgan, Golestan province (South East of Caspian Sea), Iran in 2012. Hundred and fifty hemodialysis patients centered to this study. Patients were excluded from the study if they experienced prior transplantation and have recovered kidney function, stop with dialysis, have acute renal failure and deaths. At the time of this study, eight patients were excluded. Hundred and forty two hemodialysis patients remained for further study. The mean age of patients was  $53.53 \pm 15.2$  years old. There were 70 males (49.3%) and 72 females (50.7%). An overnight fasting (after 12-h) venous blood sample was collected for determination of serum cho-

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lesterol, triglycerides, LDL-cholesterol, HDL-cholesterol and fasting blood sugar. Commercial kits were used to determine the biochemical parameters implementing spectrophotometer techniques at laboratory of 5th Azar Educational Hospital. Demographic information was registered. Systolic and diastolic blood pressure was measured in sitting position from the right hand. We have done two measurements from all hemodialysis patients. Waist circumference was measured at the point halfway between the lower border of ribs and the iliac crest in a horizontal plane. Hemodialysis patients were considered to have metabolic syndrome if they had any three or more of the following criteria, according to the ATP III (Adult Treatment Panel III) [5]:

- 1) Abdominal obesity: WC >102 cm (males) and >88 cm (females).
- 2) Hypertriglyceridemia: serum triglycerides level  $\geq$  150 mg/dl.
- 3) Low HDL-cholesterol: < 40 mg/dl in men and < 50 mg/dl in women.
- 4) High blood pressure: SBP  $\geq$  130 mmHg and/or DBP  $\geq$  85 mmHg or on treatment for hypertension.
- 5) High fasting glucose: serum glucose level  $\geq$ 110 mg/dl or on treatment for diabetes.

The results have shown as percentages and mean  $\pm$  SD. SPSS- 16 version software was used for the statistical analysis. The results were appraised by using Chi-square test.  $P < 0.05$  was considered statistically significant.

## RESULTS

A total of 142 hemodialysis patients were studied. Table 1 shows the distribution of hemodialysis patients according to gender and age. The mean age of males and females patients was  $55.27 \pm 16.42$  and  $51.83 \pm 13.43$  years, respectively. There were 70 (49.30%) males and 72 (50.70%) females. The most age distribution in males and females was in ages between 50-59 and 60-69 years. Table 2 shows hemodialysis patients with and without metabolic syndrome. The prevalence of metabolic syndrome was significantly high in range of 50-59 and 60-69 years in hemodialysis patients when compared with other age groups ( $P < 0.05$ ). Table 3 shows hemodialysis patients with and without metabolic syndrome by gender and age. There was elevated frequency of metabolic syndrome from age 50-59 and 40-49 years in male and female hemodialysis patients, respectively. The frequency of metabolic syndrome in female subjects (65.27%) was higher than male (47.14%) ( $P < 0.05$ ). The prevalence of metabolic syndrome was high in ages 50-59 years in males and females when compared with other age groups. There was a significant difference in hemodialysis patients with metabolic syndrome in ages 50-59 years in males and from ages 40-49, 50-59 and 60-69 years in females when compared with other age groups. There were no significant differences in hemodialysis patients with metabolic syndrome in other age groups. Table 4 shows number of hemodialysis patients accomplishing the criteria of metabolic syndrome. Our results show that 25.71%, 18.57% and 2.86% of males and 36.11%, 20.83% and 8.33% of females

**Table 1. Distribution of Hemodialysis Subjects by Gender and Age**

Females (n=72)	Males (n=70)	Age Groups in Years
6 (8.33)	4 (5.71)	20-29 n (%)
8 (11.11)	7 (10)	30-39 n (%)
12 (16.66)	9 (12.85)	40-49 n (%)
21 (29.16)	18 (25.71)	50-59 n (%)
20 (27.77)	16 (22.85)	60-69 n (%)
5 (6.94)	16 (22.85)	70+ n (%)
51.83 $\pm$ 13.43	55.27 $\pm$ 16.42	Ages (years)

**Table 2. Distribution of Hemodialysis Subjects with and without Metabolic Syndrome**

Without MS	With MS	Age Groups in Years
10 (7.04)	0 (0%)	20-29 n (%)
11 (7.74)	4 (2.81)	30-39 n (%)
8 (5.63)	13 (9.15)	40-49 n (%)
8 (5.63)*	31 (21.83)	50-59 n (%)
13 (9.15)*	23 (16.19)	60-69 n (%)
12 (8.45)	9 (6.33)	70+ n (%)
62 (43.66)	80 (56.33)	Total n (%)

MS: Metabolic Syndrome, \*P value less than 0.05 was considered significant.

**Table 3. Hemodialysis Subjects with and Without Metabolic Syndrome by Gender and Age**

Age Groups in Years	Males (n=70)		Females (n=72)	
	With MS	Without MS	With MS	Without MS
20-29 n (%)	0(100)	4(14.28)	0(100)	6(8.33)
30-39 n (%)	2(2.85)	5(7.14)	2(2.77)	6(8.33)
40-49 n (%)	3(4.28)	6(8.25)	10(13.88)	2(2.77)*
50-59 n (%)	14(20)	4(5.71)*	17(23.61)	4(5.55)*
60-69 n (%)	8 (11.42)	8 (11.42)	15(20.83)	5 (6.94)*
70+ n (%)	6 (8.25)	10 (14.28)	3 (4.16)	2 (2.77)
Total n (%)	33(47.14)	37(52.86)	47(65.27)	25(34.73)

MS: Metabolic Syndrome, \*P value less than 0.05 was considered significant.

**Table 4. Number of Hemodialysis Subjects Accomplishing the Criteria of Metabolic Syndrome**

Females(n=72)	Males(n=70)	Parameters
26(36.11)	18 (25.71)	3 criteria n (%)
15(20.83)	13(18.57)	4 criteria n (%)
6(8.33)	2(2.86)	5 criteria n (%)
47(65.27)	33(47.14)	Total criteria n (%)

had three, four and five criteria for metabolic syndrome, respectively.

## DISCUSSION

The prevalence of the metabolic syndrome is increasing a lot around the world. There are many studies with different findings on prevalence of metabolic syndrome among hemodialysis patients. Prevalence of metabolic syndrome changes as age proceeds. The present cross-sectional study showed the prevalence of the metabolic syndrome among female and male hemodialysis patients was 65.27% and 47.14%, respectively. Some study showed that 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  $\geq 80$  years old, respectively [15]. Hildrum et.al indicated that prevalence of the metabolic syndrome increased with age into the ninth decade of life [16]. Ford *et al.* reported that the prevalence of the metabolic syndrome was 16.5%, 40.3%, and 46.4% in males, and 19.1%, 33.8%, and 56.0%, respectively, in females among US population aged from 20 to 39, 40 to 59 and  $\geq 60$  years old, respectively. It has been shown that there was an association between older age subjects and a higher prevalence of metabolic syndrome [17]. Study of Park *et al.* showed that the prevalence of the metabolic syndrome elevates from age 20 years old through the sixty and seventy years old for males and females, respectively. Chen and colleagues [7] reported that the prevalence of metabolic syndrome in chronic kidney disease patients was 2.6% higher when compared with those without metabolic syndrome. Elsaid *et al.* showed that the incidence of metabolic syndrome in hemodialysis patients

was 62%. Prevalence of metabolic syndrome among females (74.4%) was more common than males (52.7%) [18]. Study of Al Saran *et al.* [19] showed that the prevalence of metabolic syndrome in hemodialysis patients was 62%. The prevalence of metabolic syndrome was higher among females (67%) than males (50%) which were in agreement with the findings of Hsu, Williams and Stephan *et al.* [20-22]. Study of Stoli *et al.* [23] indicated that about 30% of hemodialysis patients having progressed metabolic syndrome which was not in agreement with our findings. In our study, the prevalence of metabolic syndrome was higher in females than males in ages 50-59 years which is in agreement with other findings [7, 18-22]. A study showed that metabolic syndrome is diagnosed in more than 60% of dialyzed patients [24] Study of Ford *et al.* showed that the age-specific prevalence of MS increased from 10.7% of males and 18.0% of females aged 20-39 years to 39.7% of males and 46.1% of females aged 60 years and older [2]. Similar results have been reported in European and Chinese populations [13, 25]. Some studies have shown the association between metabolic syndrome and risk of chronic kidney disease [7, 26, 27]. It is reported that the metabolic syndrome was associated with a 2.60- and 1.89-fold elevated risk of chronic kidney disease in US adults [7]. Tanaka and colleagues showed that metabolic syndrome was significantly associated with chronic kidney disease among Japanese participants aged 30-79 years in a hospital-based screening program in Okinawa [27].

## CONCLUSION

The results of this study showed that hemodialysis females patients were more affected than males. This may de-

pend on the specific lifestyle alterations among females and males patients. Determination of metabolic syndrome allows us to predict cardiovascular disease in hemodialysis patients.

### CONFLICT OF INTEREST

The authors confirm that this article content has no conflicts of interest.

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