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Prevalence of Metabolic Syndrome in Patients with Chronic Kidney Disease: A Hospital Based Cross-Sectional Study

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Abstract

Chronic kidney disease (CKD) is an emerging health problem globally and metabolic syndrome is present in about one third of patients with CKD.

Objective: To determine the frequency of metabolic syndrome in patients presenting with chronic kidney disease.

Methods: We performed a single-center, descriptive cross-sectional trial to assess the frequency of metabolic syndrome in patients presenting with CKD. 150 patients of both genders, age 20-40 years, with a diagnosis of CKD stage 3-5 regardless of dialysis were included in this study.

Results: Mean age of the patients in the study was 28.10 ± 12.46 years. The average weight of study patients was 63.5 ± 5.8 (52-76) kilograms. Among 150 patients with CKD, 112 (75%) patients had no metabolic syndrome while half of patients of age range of range of 31-40 years had metabolic syndrome. In male had more metabolic syndrome compared to females. Patients with higher education and economic status were more likely to have metabolic syndrome and was more common among patients undergoing dialysis.

Conclusions: Metabolic syndrome is common in patients presenting with CKD that may pose a higher morbidity .

Key Words: Metabolic syndrome, Chronic Kidney Disease, Creatinine, BMI, dialysis.

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Introduction:

Metabolic syndrome is a global health issue across the world and a key contributor to morbidity and mortality. American heart association and the National heart, Lung and Blood Institute (AHA/NHLBI) have defined Metabolic Syndrome in 2005 and since 2009 it is defined as a combination of any three among the followings, raised triglyceride level (150 mg/dl or above), raised waist circumference (102 cm in male adults and 88 cm in female adults), reduced HDL-cholesterol (HDL) levels and measured less than 40 mg/dl (male adults) and 50 mg/dl for female adult patients , elevated fasting glucose ≥100 mg/dl; and elevated blood pressure ≧130/85 mm Hg.[1] The data from Pakistan showed a prevalence rate of 28.8% in healthy individuals and 70% among Pakistani patients with diabetes have metabolic syndrome.[2,3]

A recent study in USA revealed that metabolic syndrome was rising in the trend in the general population and in low educational attainment group between 2011 and 2018.[4]

Kidney Disease Outcomes Quality Initiative (KDOQI) of the National Kidney Foundation (NKF) set a specific chronic kidney disease (CKD) as a set of various pathophysiologic procedures related to inconsistent kidney activity and progressive decrease in glomerular filtration rate (GFR) lower than 60 mL/m2/1.73 times as long as 3 or more months.

CKD is a newly developing health phenomenon worldwide. This is due to the rapidly rising global prevalence of diabetes and high blood pressure. Diabetes mellitus and CKD have prevalence rates of 25.3% and 21.2%, respectively, in Pakistan. [6,7]
This study aimed to identify the prevalence of metabolic syndrome in individuals with CKD.

Methods:

Settings: This study was conducted In Nephrology outpatient department of the Pakistan Institute of Medical Sciences, Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad, Pakistan, over a period of 6 months (Feb 2016-Aug to 2016).
Study Design: This cross-sectional study included 150 participants.
Metabolic Syndrome was characterized by the existence of any three of the following variables: increased amount of triglycerides 150 mg/dl; increased abdominal circumference in adults 102 cm (male) and 88 cm (female), reduced HDL-cholesterol (HDL) level in adults<40 mg/dl (male) and <50 mg/dl (female), increased fasting glucose level in adults-100 mg/dl, and increased blood pressure in adults-130/85 mm Hg.
CKD is related to impaired kidney function and a gradual loss of glomerular filtration rate (GFR) of less than 60 mL/min/1.73 m2 over three or more months. It was diagnosed based on the levels of urea (> 50 mg/dl) and creatinine (> 1.5 mg/dl in men and > 1.3 mg/dl in women).
Inclusion criteria: Both male and female patients aged between 20-40 years who had either just been diagnosed or previously diagnosed with CKD (using the measurement of urea and creatinine as in the operational definition) and had stage 3-5 diseases of CKD, whether on dialysis or not, were considered in this study.
Exclusion criteria: Patients with known hypothyroidism, familial dyslipidemia, obesity, or congestive cardiac failure were excluded from the study.
Data Collection: Informed written consent was obtained, and the patients were enrolled in the study. Subsequently, the necessary ethical approval was obtained from the hospital ethics committee (dated:6-12-2015, F.1-1/2015/ERB/SZABMU/). We performed in-depth analyses of the past. The height and weight of the patients were measured to calculate their BMI. Blood pressure was measured, and the waist perimeter of each patient was determined. A total of 3 ml blood was drawn in a serum bottle under aseptic measures to determine the levels of serum triglyceride, HDL cholesterol, LDL cholesterol, fasting glucose, and urea creatinine. The serum bottle was labeled with the hospital number and that of the patient and taken to the hospital laboratory. These reports were generated by a consultant biochemist.

The outcomes were documented using a specially made proforma, as well as the demographic characteristics of all patients.

Statistical analysis of the data was performed using SPSS version 16 (IBM, Armonk, New York, USA). Categorical variables, such as sex and metabolic syndrome, were calculated. Continuous variables that were in the form of numerical numbers, such as age, waist circumference, blood pressure, serum triglyceride level, HDL-C, LDL cholesterol, urea, creatinine, fasting glucose, and duration of CKD, were used to calculate the mean and standard deviations. The effect modifiers, such as age, gender, stage, and duration of chronic kidney disease, on dialysis or not, were already stratified. The chi-square test of post-stratification was used. Statistical significance was set at $p < 0.05$.

Results

The number of patients in the study comprised of a total of 150 patients. The patients had a mean age of 29.80 ± 11.02 (20-40) years. Table 1 indicates the percentage of patients with respect to age range, gender, marital status, and socioeconomic status.

Table 1: Presence of metabolic syndrome among 150 patients with CKD 4-5.

	Category	MetS* Yes (n)	MetS* No (n)	Total (n)	P-value
Age category (yrs)	20–30	13	80	93	<0.01
	31–40	29	28	57	
Education status	Primary	12	31	43	<0.001
	Middle	9	24	33	
	Matriculation	5	33	38	
	Intermediate	7	17	24	
	Post Graduation	5	7	12	
Socioeconomic status	Poor	5	57	62	<0.01
	Middle Class	13	34	47	
	High Class	20	21	41	
Marital status	Married	23	72	95	0.049
	Unmarried	15	40	55	
Gender	Male	22	51	87	<0.001
	Female	16	40	63	

*MetS: Metabolic Syndrome

The mean weight of the patients was 63.5 ± 5.8 (52-76) kilograms. The average height was 169.5 ± 13.0 (15.3-179.6). The BMI of patients in the study was 21.8 ± 1.3 (19-24.7). Of the 150 patients with CKD, 75 per cent had no metabolic syndrome, whereas 25 per cent had metabolic syndrome (Figure 1).
Table 2 presents the data concerning the distribution of age, socioeconomic status, marital status, CKD stage, duration of dialysis, and presence of MetS.

Discussion

In the present research, MetS was present in a quarter of our CKD stage 4-5 patients as per the joint statement of several associations.1 The prevalence of MetS in patients with CKD not on dialysis rises with higher stages of CKD and is much higher in those patients on maintenance hemodialysis up to more than 70%.[8]

Figure 1: Distribution of Metabolic syndrome among 150 CKD 4-5 patients.

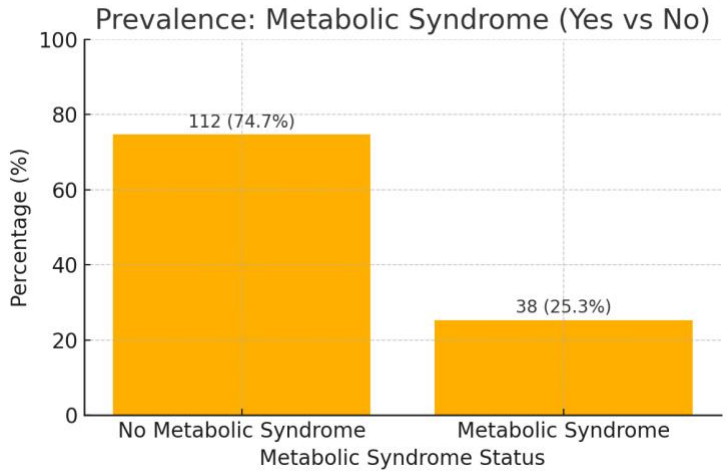

Table 2: Distribution of metabolic syndrome according to the CKD stage, dialysis total duration of CKD.

	Category	*MetS Yes (n)	*MetS No (n)	Total (n)	P value
Stages of CKD	CKD4	12	99	111	0.049
Stages of CKD	CKD5	26	13	39	0.049
Duration of CKD	<1 year	3	40	43	0.002
Duration of CKD	1-3 years	23	44	67	0.002
Duration of CKD	>3 years	12	28	40	0.002
Dialysis Status	YES	12	35	47	0.053
Dialysis Status	NO	26	77	103	0.053

*MetS: Metabolic Syndrome

It has also been revealed that the high occurrence of MetS is linked with an increased risk of CKD compared with individuals who have no MetS. There is a complex association between the existence of cardiovascular (CVD), kidney, and metabolic problems, which is defined as cardiovascular-kidney-metabolic (CKM) health. In the most recent definition given by the American Heart Association, CKM

health is a systemic disease due to a pathophysiological interplay between CKD, CVD, and metabolic risk factors, including obesity, dyslipidemia, hypertension, and hyperglycemia.[10] CKM health is associated with poor clinical outcomes in terms of all causes of mortality and ESKD as comorbidity increased. In a study by Meng et al. High mortality and development of ESKD was linked to levels of advancing stages of CKM, declining GFR, anemia, high phosphorus and calcium-phosphorus product in their study.[11] All these are known to already result in poor performance in CKD, however because of the presence of MetS, the odds are higher.[12,13] In our study higher stages of CKD were found to be associated with higher chances of occurrence of MetS.

In our study, a higher socioeconomic status and lower education level were linked to the status of having MetS. This observation partly coincides with the case put forward by Pitino A et.al, whereby the lower the educational status the worse was the outcomes and also lower socioeconomic status was similar.14 Another study conducted in Pakistan by Qabulio SN et.al also noted a lower socioeconomic status to be associated with MetS, this may be due to the smaller sample size in our study.15

Conclusion

In summary, the current study creates awareness of MetS as an important event in patients with CKD and a probable cause of morbidity and mortality in the future. Special concern in the identification of the existence of MetS and its control will assist in enhancing the care provided to patients with CKD.

Disclosures/Conflict of Interest:

Authors declare no conflict of interest

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