

# Prevalence of Metabolic Syndrome among Patients of Chronic Kidney Disease Visiting Outpatient Department, District Headquarter Teaching Hospital, Gujranwala

Hamad Ahmad<sup>1</sup>, Mir Jam Talpur<sup>2</sup>, Awais Hafeez<sup>3</sup>

<sup>1</sup>Resident, Department of Gastroenterologist, Hayatabad Medical Complex, Peshawar, Pakistan.

<sup>2</sup>Associate Professor, Department of Paediatrics, Bilawal Medical College, Jamshoro, Pakistan.

<sup>3</sup>MBBS, Chandka Medical College, Larkana, Pakistan.

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## ABSTRACT

**Background:** Aim: The metabolic syndrome (MetS) components are the established risk factors for the development of chronic kidney disease (CKD). That is why; metabolic syndrome and its several components have a detrimental effect on subjects suffering from chronic kidney disease. The purpose of this analysis is to determine the prevalence of metabolic syndrome in chronic kidney disease patients and to investigate the relationship of each MetS component with CKD. Study Design: A cross-sectional study. Place and Duration: In the Medicine department of DHQ Teaching Hospital Gujranwala for one-year duration from March 2019 to March 2020. **Methods:** 180 chronic kidney disease patients were enrolled in the study. According to the national kidney guidelines, the definition of chronic kidney disease was defined. A semi-structured proforma was used to document the patients' anthropometric measurements. The blood samples in fasting state were taken to measure serum triglycerides, HDL cholesterol, and fasting blood sugar. Modified National Cholesterol Education Program Adult Treatment Program III criteria were applied to evaluate the patients of CKD with the metabolic syndrome. The data were analyzed using the Chi-square test and t-test. **Results:** Conferring to the Modified National Cholesterol Education Program Adult Treatment Program III criteria, 80 patients of metabolic syndrome with chronic kidney disease were identified. High fasting blood sugar levels, hypertension, high waist circumference, low HDL cholesterol and high triglycerides in patients of chronic kidney disease were as follows; 56 (31.1%), 132 (73.3%), 50 (27.7%), 118 (65.5%) and 94 (52.2%) respectively. Of the five metabolic syndrome components, the highest positive predictive value was of the waist circumference has (70.00%) for CKD. **Conclusion:** The prevalence of metabolic syndrome components is greater in chronic kidney disease affected patients.

**Keywords:** Dyslipidemia, Metabolic Syndrome, Hypertension

## INTRODUCTION

In a sedentary or a high-calorie diet lifestyle, the main reasons for the metabolic syndrome (MetS) are communal even in underdeveloped regions like Pakistan. Numerous studies are linking metabolic syndrome with CKD. In addition to traditional risk factors such as hypertension and hyperglycemia, waist circumference (WC) has also been significantly correlated with reduced glomerular filtration rate (eGFR) and microalbuminuria. Components of MetS are among the established risk factors for CKD. Hence, the interaction of MetS and various MetS components can have a detrimental effect on CKD patients. Most of these studies were conducted in the general population. Though, this analysis evaluates the frequency of MetS in CKD patients and the association of each MetS component with CKD in Southeast Asia. Our study aims to investigate the MetS prevalence in CKD patients and

to investigate the relationship of each MetS component to CKD. The metabolic syndrome increases mortality (Thomas et al., 2017) and is also associated with conditions such as non-alcoholic fatty liver disease (Abdeen et al., 2006) and sleep apnea (Vgontzas et al., 2005), colorectal cancer, and cancers of breast and uterus (Chan et al., 2017a; Xue and Michels, 2017). Quite recently, it is also linked to kidney problems. Metabolic syndrome prevalence globally has reached epidemic levels. In the USA, the prevalence of MetS is between 30–35% in both men and women, and around 20–30% in the United Kingdom (Ford and Mannino, 2004; Tillin et al., 2005; Cheung et al., 2016). In Pakistan, the prevalence of MetS is around 14%, as reported in a recent study by Saleem et al. (2015).

## MATERIALS AND METHODS

This cross-sectional study was held in the medicine department of DHQ Teaching Hospital Gujranwala for one-year duration from March 2019 to March 2020. 180 patients with CKD were selected for the study. CKD was defined as <60 ml/min GFR per 1.73 m<sup>2</sup> body surface or a urinary-albumin to creatinine ratio of greater than 30. A semi-structured

### Name & Address of Corresponding Author

Dr Hamad Ahmad  
Resident,  
Department of Gastroenterologist,  
Hayatabad Medical Complex,  
Peshawar, Pakistan.

proforma was used to record the different parameters such as waist circumference, weight, and height of the patients. Waist circumference was determined at the uppermost point of the iliac crest at the end of expiration. Two blood pressure (BP) values were calculated in a resting position by mercury sphygmomanometer after a ten-minute rest period and the mean was used for the analysis. The blood samples in the fasting condition were taken for the triglycerides (TG), glucose (FBG), and HDL cholesterol levels. CKD patients were identified with MetS using the modified standards of the NCEP ATP III. Rendering to the NCEP report, patients with 3 or above of the subsequent criteria were distinct as having the MetS 1) TG  $\geq 1.7$  mmol/l 2) Abdominal obesity, WC  $>88$  cm in females and  $>102$  cm in males 3) HDL-C  $<1.29$  mmol/l in females and  $<1.03$  mmol/l in males, 4) FBG  $\geq 5.6$  mmol/l. 5) Systolic BP  $\geq 130$  mmHg or a Diastolic BP  $\geq 85$  mmHg. The participants who reported that they are currently using antihypertensive or anti-diabetic drugs are thought to have high blood pressure or diabetes. The data were analyzed using SPSS 19.0. The variance between continuous variables was calculated using the t-test and the relationship between categorical variables was measured using the chi-square test. A p-value of less than 0.05 was taken to determine the two-tailed level of statistical implication at a confidence interval of 95%.

## RESULTS

180 confirmed CKD patients were enrolled with their consent. Of these patients, 80 (44.45%) had MetS according to modified NCEP ATP III criteria. The frequency of individual MetS components in patients with CKD is given in [Table 1]. Of the five metabolic syndrome components, waist circumference has the maximum positive predictive value (PPV).

**Table 1: Prevalence of various components of MetS in CKD patients**

Components of MetS	Number of patients Percentage (%)	
Hypertension	132	73.3
High FBG	56	31.1
High TG	94	52.2
Low HDL-C	118	65.5
High WC	50	27.7

## DISCUSSION

The metabolic syndrome is a global community health issue. There are several studies on the pervasiveness of metabolic syndrome in Southeast Asia. Most of these studies were conducted in the general population.<sup>[8,9]</sup> To the best of our knowledge, this is the 1st analysis that determines the frequency of MetS in CKD patients in Southeast Asia. In this

study, the occurrence of MetS was 44.44% in patients with CKD.<sup>[10]</sup> Johnson et al. in the 2007 studied, that the prevalence of MetS (as defined by the WHO) was 30.5% in 200 patients with grade 4 and 5 CKD.<sup>[11,12]</sup> In the same study, the prevalence of MetS was 50% in patients undergoing dialysis. In 2004, Chen et al. found a substantial association between the number of MetS traits with albuminuria and decreased eGFR of less than 60 ml/min per 1.73 m<sup>2</sup>, signifying that MetS may be an important factor in the development of CKD.<sup>[13,14]</sup> This study showed a high prevalence of hypertension (70%) in patients with CKD. The low glomerular filtration rate causes salt and water retention and thus causes hypertension.<sup>[15,16]</sup> Many other factors, such as the activation of the renin-angiotensin system, are related to CKD as an etiological factor for hypertension. In the USA, the third national health and nutrition study showed a similarly high prevalence, indicating that 70% of patients with high serum creatinine had hypertension.<sup>[17,18]</sup> Our study showed that 46.25% and 61.25% of CKD patients had higher TG and lower HDL-C levels. Several studies have shown that dyslipidemia is a common feature in patients with CKD.<sup>[19]</sup> Depending on the type and severity of lipid abnormalities, patient populations vary in their kidney functions. Parikh et al. In 2008 reported, that higher TG levels were present in 40% of patients with CKD and 45% of patients had lower HDL-C levels in Pakistan.<sup>[21]</sup> Hosseinpanah et al. In 2009 reported, that dyslipidemia was found in 65.6% of patients with CKD in Iran. Amongst individual MetS components, increased waist circumference has the highest PPV (73.34%), followed by high DBP and FBG; High SBP has the lowest PPV.<sup>[22,23]</sup> It shows that central obesity is one of the biggest risk factors for CKD and may predispose CKD patients to greater morbidity and mortality. Hyperglycemia and hypertension are risk factors for CKD, hence both factors play a role in the pathogenesis of CKD, regardless of metabolic syndrome.

## CONCLUSION

Our results show that MetS, defined by modified NCEP criteria, occurs in more than forty percent of patients with CKD. It was also found that the waist circumference had the highest PPV. Therefore, more attention should be paid to central obesity and blood lipid control in patients with CKD. More research is required to govern if the treatment of MetS and its component will be beneficial in improving results in patients with CKD.

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