Original Article

Chronic Kidney Disease

Frequency of Chronic Kidney Disease in Patients with Metabolic Syndrome

Syed Saif-ur-Rehman[1], Hidayat-Ul-Haq[2], Adnan Ghafoor[3], Jahanzeb Maqsood[1], Abida Mateen Ansari[1] and Muhammad Wajad Munir[1]

ABSTRACT

Objective: To determine the frequency of chronic kidney disease in patients with metabolic syndrome.
Study Design: Cross-sectional study
Place and Duration of Study: This study was conducted at the Department of General Medicine, Fauji Foundation Hospital, Rawalpindi for Six months from May, 2017 to November, 2017.
Materials and Methods: A total of one hundred and thirty-four (n=134) clinically diagnosed cases of metabolic syndrome of either gender between age 18 to 70 years were enrolled in the study. Glomerular filtration rate was estimated in each patient and frequency of Chronic kidney disease was determined.
Results: Out of one hundred and thirty-four (n=134), 18.7% (n=25) patients were diagnosed with chronic kidney disease, which was significantly higher in patients with longer duration of Metabolic Syndrome (P<0.05)**.** No significant difference was observed when results were stratified with respect to age and gender (P>0.5).
Conclusion: Significant percentage (18.7%) of patients with metabolic syndrome had chronic kidney disease which was significantly higher in patients with longer duration of disease.
Key Words: Chronic kidney disease**,** Metabolic syndrome, Glomerular filtration rate, Duration, Frequency

Citation of article: Syed Rehman SS, Haq H, Ghafoor A, Maqsood J, Ansari MA, Munir MW. Frequency of Chronic Kidney Disease in Patients with Metabolic Syndrome. Med Forum 2020;31(11): 188-191.

INTRODUCTION

Metabolic syndrome (MetS), previously called "syndrome X" is defined as a cluster of components associated with excessive adiposity due to over nutrition and sedentary life style.[1] These components are abdominal obesity, insulin resistance, dyslipidemia and increased blood pressure. CVD risk is increased by 2 times, whereas type 2 diabetes mellitus (DM) is increased by 5 times in MetS[2,3]The prevalence of metabolic syndrome in Pakistani general population is well studied. According to different definitions is reported to be from 18% to 46%.[1] Chronic kidney disease (CKD) is increasing being recognized as a major public health issue worldwide.[5,6]

Recent researches noted that the population prevalence of CKD has exceeded 10%, more than 50% of whom were in high-risk sub-populations.[1] Furthermore, mortality from kidney disease has increased by 83% since 1990. The adverse consequences associated with CKD including kidney failure, accelerated cardiovascular disease (CVD), and premature mortality have shown to have greater socioeconomical impact in low- and middle-income countries like Pakistan.[7,8] The overall prevalence of chronic kidney disease in Pakistan ranges from 8% to 25%.[8] Studies show that patients with MetS have a 2.5-fold higher risk of developing CKD.[2] A meta-analysis of eleven studies with 30146 subjects reported that MetS was associated with development of CKD (defined as eGFR < 60 mL/min per 1.73 m^2), with odds ratio (OR) 1.55 (95%CI: 1.34-1.80). In a recent study authors investigated the association between metabolic syndrome and CKD in a 10-year population-based longitudinal study. They reported 14.7% of patients with metabolic syndrome developed CKD during the follow up period.[3]

The gathered data will help in better understanding of presence of CKD in metabolic syndrome and will help in identifying patients with metabolic syndrome who are at higher risk of developing CKD. This will eventually enable the physicians to implement more stringent monitoring to prevent the CKD in these patients.

MATERIALS AND METHODS

This Cross-sectional study was conducted at Department of General Medicine, Fauji Foundation Hospital, Rawalpindi for six months from 10th May, 2017 to 10th November, 2017 after approval from

1. Department of Medicine, Al-Nafees Medical College Hospital, Islamabad.
2. Department of Medicine, Fauji Foundation Hospital, Rawalpindi.
3. Department of Medicine, Foundation Medical College, Islamabad.

Correspondence: Dr. Syed Saif-ur-Rehman, Assistant Professor of Medicine, Al- Nafees Medical College Hospital, Islamabad.
Contact No: 0300-5345671
Email: Saifgillani786@gmail.com

Received: January, 2020
Accepted: August, 2020
Printed: November, 2020

hospital ethical committee. The sample size was calculated (n=134) with anticipated population proportion of 14.7%, significance Level of 5% and with precision of 6%. Non probability purposive sampling technique was employed. Clinically diagnosed cases of metabolic syndrome, with age 18 to 70 years of both genders are included in the study. Patients with history of hyperlipidemia secondary to nephrotic syndrome, hypothyroidism, and Cushing syndrome, on steroid therapy, Dialysis dependent diabetic CKD patients and patients who were not willing to participate in the study were excluded.

Patients from outpatient department of FFH Rawalpindi who fulfilled criteria was included in the study. Detailed history regarding the illness was obtained from each patient. Complete clinical examination was performed by the trainee researcher including measurement of blood pressure and abdominal obesity. Specific laboratory tests were performed including fasting blood glucose levels, lipid profile and renal function tests from the hospital laboratory. Estimated GFR was calculated as per operational definition in all these patients. All this information recorded on a preset Performa.

Data was entered on computer software SPSS version 20. Quantitative variables like age, duration of MS and GFR were expressed as mean ± SD. Frequencies and percentages were calculated for qualitative variables like gender, residence and presence of CKD. Effect modifiers like age, gender and duration of MS was controlled by stratification. Post stratification chi-square test was applied and P-value $\leq$ 0.05 was considered as significant.

RESULTS

A total of one hundred and thirty-four (n=134) clinically diagnosed cases of metabolic syndrome of either gender between age 18 to 70 years were enrolled in the study. GFR was estimated in each patient and frequency of CKD was determined. Distribution of gender age, urban or rural distribution (years) and duration of MS (years) in the study population was presented in table 1.

Mean GFR (ml/min) in the study population was tabulated as shown in table 1. Out of one hundred and thirty-four (n=134), 18.7% (n=25) patients were diagnosed with chronic kidney disease. Results are shown in table 1.

No significant difference was observed when results were stratified with respect to age and gender (P>0.05 in both cases). Frequency of CKD was significantly higher in patients who had duration of Ms more than 5 years when compared to ones having less than 5 years duration (P=0.01). Results were tabulated in table 2.

Table No.1: Demographic and clinical profile of the study Population (n=134)

Variables	Frequency	Percentage
Gender		
Males	82	61.2%
Females	52	38.8%
Residence		
Urban	62	46.3
Rural	72	53.7
Mean GFR		
Male	89.2	21.4
Female	85.8	20.9
Total	87.9	21.2
Chronic kidney disease		
Present	25	18.67
Absent	109	81.3
Total	139	100.0
Duration of metabolic syndrome (years)		
Gender	Age (years)	Duration of ms (years)
Male	52.5 ± 15.8	2.9 ± 2.2
Female	48.1 ± 14.4	2.6 ± 2.5
Total		
Female	48.1 ± 14.4	2.6 ± 2.5

Table No.2: Age, gender and duration of metabolic syndrome based stratification of study population (n=134)

	Ckd		Total	P-value chi-square
Age category	Present	Absent		
18-40 years	9	27	36	0.253
	25.0%	75.0%	100.0%	
41-70 years	16	82	98	
	16.3%	83.7%	100.0%	
Total	25	109	134	
	18.7%	81.3%	100.0%	
Males	14	68	82	0.555
	17.1%	82.9%	100.0%	
Females	11	41	52	
	21.2%	78.8%	100.0%	
Total	25	109	134	
	18.7%	81.3%	100.0%	
Metabolic syndrome < 5 years	9	97	106	0.001
	8.5%	91.5%	100.0%	
Metabolic syndrome > 5 years	16	12	28	
	57.1%	42.9%	100.0%	
Total	25	109	134	
	18.7%	81.3%	100.0%	

DISCUSSION

Several studies reported that metabolic syndrome was associated with development of chronic kidney disease.[9,10] Present study was designed to study this association in local population. Our results showed that Out of one hundred and thirty-four (n=134), 18.7% (n=25) patients were diagnosed with chronic kidney disease as per our operational definition, which was significantly higher in patients with longer duration of MS (P<0.05)**.** No significant difference was observed when results were stratified with respect to age and gender (P>0.5). These results are similar to data in Korean Genome Epidemiology Study. Huh JH et al[10] analyzed 10,030 subjects who had 10-year of follow-up period, CKD developed in 893 subjects (14.7%). Compared to subjects without MS, the odds ratio (OR; 95% confidence interval, CI) of incident CKD in those with MS was 1.38 (1.16-1.64) after controlling for confounding factors.

Thomas G et al[11] aimed to systematically review the association between MetS, its components, and development of microalbuminuria or proteinuria and CKD. Pooled results showed that MetS was significantly associated with the development of eGFR <60 ml/min per 1.73 m^2 (odds ratio, 1.55; 95% CI, 1.34, 1.80). The strength of this association seemed to increase as the number of components of MetS increased (trend P value = 0.02).

There are several other studies reported risk estimates for the development of eGFR <60 ml/min per 1.73 m^2 in patients with MetS. They further examined the associations of individual components of MetS and the risk for eGFR <60 ml/min per 1.73 m^2. All individual components of MetS showed a positive association with the development of eGFR <60 ml/min per 1.73 m^2. The strength of association between MetS and the development of eGFR <60 ml/min per 1.73 m^2 seems to increase as the number of components increased from 1 to 5 (trend P-value 0.02). Although patients with one component had no significant increase in the odds for development of eGFR <60 ml/min per 1.73 m^2, patients with all five components of MetS had an OR of 1.96 (95% CI 1.71, 2.24) for development of eGFR <60 ml/min per 1.73 m^2.[13-19]

Singh AK, et al[9,20] in their systematic review discusses the epidemiology, pathology and potential mechanisms for the relationship of MetS with CKD. They found that studies showed patients with MetS have a 2.5-fold higher risk of developing CKD. Renal dysfunction becomes apparent long before the appearance of hypertension or diabetes in MetS. More studies are needed to precisely elucidate the mechanisms that might lead upstream factors such as insulin resistance, hypertension, dyslipidemia and inflammation to cause renal fibrosis.

CONCLUSION

Significant percentage (18.7%) of patients with metabolic syndrome had chronic kidney disease which was significantly higher in patients with longer duration of disease.

Author's Contribution:

Concept & Design of Study:	Syed Saif-ur-Rehman
Drafting:	Hidayat-Ul-Haq, Adnan Ghafoor
Data Analysis:	Jahanzeb Maqsood, Abida Mateen Ansari and Muhammad Wajad Munir
Revisiting Critically:	Syed Saif-ur-Rehman, Hidayat-Ul-Haq
Final Approval of version:	Syed Saif-ur-Rehman

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Porrini E, Navarro-Díaz M, Rodríguez-Rodríguez R, Salido E. Renal Disease in Obesity, Metabolic Syndrome and Diabesity. I J Diabetic Nephropathy Https://doi.org/10.1007/978-3-319-93521-8_5Springer,
2. Fawwad A, Siddiqui IA, Zeeshan NF, Shahid SM, Basit A. Association of SNP rs9939609 in FTO gene with metabolic syndrome in type 2 diabetic subjects, rectruited from a tertiary care unit of Karachi, Pakistan. Pak J Med Sci 2015;31: 140-5-8.
3. Nagler EV, Morton RL, massonp, chronic kidney disease. Lancet 2017;389(10075);1238-52..
4. Eckardt KU, Coresh J, Devuyst O, Johnson RJ, Köttgen A, Levey AS, et al. Evolving importance of kidney disease: from subspecialty to global health burden. Lancet 2013;382:158-69.
5. Xie Y, Bowe B, Mokdad AH, Xian hyan Y,Li T. Analysis of the Global Burden of Disease study highlights the global, regional, and national trends of chronic kidney disease epidemiology from 1990 to 2016.Kidney Int 2018;94(3):567-581.
6. Mark PB. Strategies to manage cardiovascular risk in chronic kidney disease nephrology dialysis Transplantation 2018;33(1):23–25.
7. Alam A, Amanullah F, Baig-Ansari N, Lotia-Farrukh I, Khan FS. Prevalence and risk factors of kidney disease in urban Karachi: baseline findings from a community cohort study. BMC Research Notes 2014;7:179-82.
8. Imran S, Sheikh A, Saeed Z, Khan SA, Malik AO, Patel J, et al. Burden of chronic kidney disease in an urban city of Pakistan, a cross-sectional study. J Pak Med Assoc 2015;65:366-9.

9. Singh AK, Kari JA. Metabolic syndrome and chronic kidney disease. Curr Opin Nephrol Hypertens 2013;22:l98-203.
10. Huh JH, Yadav D, Kim JS, Son JW, Choi E, Kim SH, et al. An association of metabolic syndrome and chronic kidney disease from a 10-year prospective cohort study. Metabolism 2017;67: 54-61
11. Thomas G, Sehgal AR, Kashyap SR, Srinivas TR, Kirwan JP, Navaneethan SD. Metabolic syndrome and kidney disease: a systematic review and meta-analysis. Clin J Am Soc Nephrol 2011;6:2364–73.
12. Kitiyakara C, Yamwong S, Cheepudomwit S, Domrongkitchaiporn S, Unkurapinun N, Pakpeankitvatana V, et al. The metabolic syndrome and chronic kidney disease in a southeast Asian cohort. Kidney Int 2007;71:693–70o.
13. Tozawa M, Iseki C, Tokashiki K, Chinen S, Kohagura K, Kinjo K, et al. Metabolic syndrome and risk of developing chronic kidney disease in Japanese adults. Hypertens Res 2007;30:937–943
14. Bowlby W, Zelnick LR, Henry C, Himmelfarb J, Kestenbaum B, Utzschneider KM. ET AL Physical activity and metabolic health in chronic kidney disease: a cross-sectional study. BMC Nephrol 2016;17: 187.
15. Kong AP, Yang X, Luk A, Cheung KK, Ma RC, So WY, et al. Hypoglycaemia, chronic kidney disease and death in type 2 diabetes: the Hong Kong diabetes registry.
BMC Endocr Disord 2014;14:48.
16. Cao X, Zhou J, Yuan H, Wu l, Chen Z. Chronic kidney disease among overweight and obesity with and without metabolic syndrome in an urban Chinese cohort. BMC Nephrol 2015;16:85.
17. Ninomiya T, Kiyohara Y, Kubo M, Yonemoto K, Tanizaki Y, Doi Y, et al. Metabolic syndrome and CKD in a general Japanese population. The Hisayama Study. Am J Kid Dis 2006;48:383–91.
18. Rashidi A, Ghanbarian A, Azizi F. Are patients who have metabolic syndrome without diabetes at risk for developing chronic kidney disease? Evidence based on data from a large cohort screening population. Clin J Am Soc Nephrol 2007;2:976–83.
19. Sun F, Tao Q, Zhan S. Metabolic syndrome and the development of chronic kidney disease among l18,924 non-diabetic Taiwanese in a retrospective cohort. Nephrol 2010;15:84–92.
20. Ryu S, Chang Y, Woo HY, Lee KB, Kim SG, Kim DI, et al. Time-dependent association between metabolic syndrome and risk of CKD in Korean men without hypertension or diabetes. Am J Kidney Dis 2009;53:59–69.