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Prevalence of Metabolic Syndrome in Non - Diabetic Chronic Kidney Disease Patients

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ABSTRACT

Background

The influence of metabolic syndrome (MS) on kidneys is predominantly chronic renal failure and end-stage renal disease as a consequence. Evidences points an association between MS and CKD mostly a positive correlation. Hence the present study was taken up to study the prevalence of metabolic syndrome in Non-Diabetic Chronic kidney disease patients.

Material & Methods

This is an observational cross-sectional study done in department of General Medicine in GSL Medical College & General Hospital, Rajahmundry done in 183 patients with chronic kidney disease from October 2019 to March 2021.

Results

No statistically significant difference was observed in the case of Hb% and FBS. Whereas the mean serum creatinine in cases with metabolic syndrome was found to be 6.80 ±2.67(mg/dl) and in the case without metabolic syndrome, it was 3.58 ±1.53(mg/dl) and the difference in the mean serum creatinine levels was found to be statistically significant. The mean difference across the values in cases with and without metabolic syndrome was found to be statistically significant.

Conclusion

The results of the present study demonstrate that the prevalence of metabolic syndrome in non-diabetic CKD individuals is high. There is a progressive increase in metabolic syndrome prevalence with advancing stage of CKD.

Keywords

Metabolic syndrome, Chronic kidney disease, Non-Diabetic Chronic kidney disease.

INTRODUCTION

Metabolic syndrome (MS) is characterized by a combination of metabolic disorders which increase the risk for heart disease, stroke, and all-cause mortality in the general population[1]. These metabolic disorders include central obesity, dyslipidaemia (high triglycerides and low HDL-cholesterol), elevated blood pressure, and dysregulated glucose homeostasis. Commonly, MS is defined by the presence of at least three of the above components, but the presence of an increased number of its components confers a much better MS definition[2,3].

Chronic kidney disease (CKD) defined by a poor estimated glomerular filtration rate (eGFR) below 60 mL/min/1.73 m^2 and/or the presence of albuminuria shows increased age-adjusted prevalence rate golbally[4, 5]. The influence of MS on kidneys is predominantly chronic renal failure and end-stage renal disease as a consequence. Evidences point that an independent association exists between MS and CKD mostly a positive correlation.[6] Patients with MS have 1.4, 2.4, or 2.6-fold greater odds of incident CKD (development of an eGFR < 60 mL/min/1.73 m2)[7 8 9] than individuals without any MS components.

Also, individuals with CKD have higher prevalence rates of MS components than individuals without CKD including traditional and non-traditional predictors, insulin resistance, and elevation of inflammatory markers including cytokines and high-sensitivity C-reactive protein (hsCRP).[10] Hence the present study was taken up to study the prevalence of metabolic syndrome in Non-Diabetic Chronic kidney disease patients.

AIM & OBJECTIVES

AIM

To study the prevalence of metabolic syndrome in Non-Diabetic Chronic kidney
disease patients.

OBJECTIVES

1. To screen all non-diabetic CKD patients for metabolic syndrome.
2. To relate the number of components of metabolic syndrome with increased risk of CKD.
3. To study whether individual components of metabolic syndrome have a role in the development of CKD.
4. To study whether the risks for CKD increase progressively as the number of components of metabolic syndrome increases.

MATERIAL & METHODS

This is an observational cross-sectional study done in department of General Medicine in GSL Medical College & General Hospital, Rajahmundry from October 1 ST, 2019 to March 31 ST 2021. A total of 183 patients with CKD with the age of 20-80yearsattending Medicine Department of GSL medical college and General Hospital are included while patients with Baseline diabetes mellitus and Acute kidney injury are excluded. Detailed history, clinical examination along with investigations like fasting blood sugar, postprandial blood sugar, serum creatinine, fasting lipid profile, urine albumin, USG abdomen and pelvis, and serum electrolytes were

done. All the statistical analysis was compiled by SPSS software trial version 20.0 and MS Excell-2013.P- value <0.05 was considered statistically significant.

RESULTS

In the present study, prevalence of metabolic syndrome was seen in 57.9% of the cases. In the present study, 29% of the patients had stage 1 CKD, 29% had stage 2 CKD, 14.8% had stage 3 CKD, 9.8% had stage 4 CKD and 17.5% had stage 5 CKD.

Stages of CKD and metabolic syndrome

In the present study in cases with metabolic syndrome 9.4% belonged to stage 1 CKD, 17.9% belonged to stage 2 CKD, 25.5% had stage 3 CKD, 17% had stage 4 CKD, 30.2% had stage 5 CKD.

In the present study in the cases without metabolic syndrome, 55.8% of the cases were in stage 1, 44.2% of the cases had stage 2 CKD, and none had stage 3,4,5 CKD.

There was a statistically significant association between the stages of CKD and metabolic syndrome. It was observed that the prevalence of metabolic syndrome increased with the severity of CKD.

Stages of CKD	Metabolic Syndrome				Total	
	Yes		No			
	N	%	N	%	N	%
Stage 1 CKD	10	9.4%	43	55.8%	53	29%
Stage 2 CKD	19	17.9%	34	44.2%	53	29%
Stage 3 CKD	27	25.5%	0	0.0%	27	14.8%
Stage 4 CKD	18	17.0%	0	0.0%	18	9.8%
Stage 5 CKD	32	30.2%	0	0.0%	32	17.5%
Total	106	100%	77	100%	183	100%
Chi square test = 99.70, p= <0.0001*, Statistically significant						

Table1: Stages of CKD and metabolic syndrome.

Metabolic syndrome and Laboratory profile

No statistically significant difference was observed in the case of Hb% and FBS. Whereas the mean serum creatinine in cases with metabolic syndrome was found to be 6.80 ±2.67(mg/dl) and in the case without metabolic syndrome, it was 3.58 ±1.53(mg/dl) and the difference in the mean serum creatinine levels was found to be statistically significant.

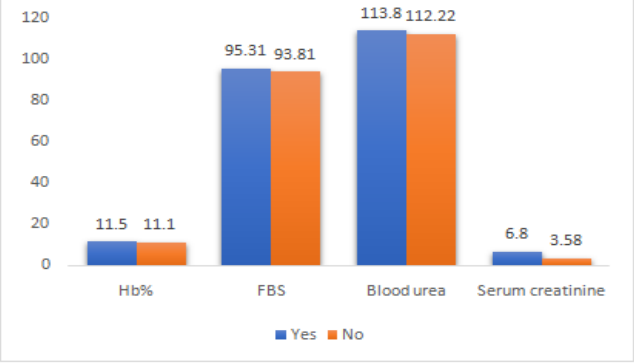

Figure1: Bar diagram showing metabolic syndrome and Laboratory profile

Metabolic syndrome and Lipid profile

In the cases, with metabolic syndrome, the mean value of LDL observed was 111.56 ± 20.89(mg/dl) and the mean value in cases without metabolic syndrome was 99.92 ± 23.14(mg/dl) and the difference in the mean values was found to be statistically significant and the mean value was found to be significantly higher in cases with metabolic syndrome when compared to cases without metabolic syndrome.

In the cases, with metabolic syndrome, the mean value of HDL observed was 45.63 ± 11.81(mg/dl) and the mean value in cases without metabolic syndrome was 54.64 ± 11.34(mg/dl) and the difference in the mean values was found to be statistically significant and the mean value was found to be significantly lower in cases with metabolic syndrome when compared to cases without metabolic syndrome.

In the cases, with metabolic syndrome, the mean value of triglycerides was 159.98 ± 22.29(mg/dl) and the mean value in cases without metabolic syndrome was 143.35 ± 18.34(mg/dl) and the difference in the mean values was found to be statistically significant and the mean value was found to be significantly higher in cases with metabolic syndrome when compared to cases without metabolic syndrome.

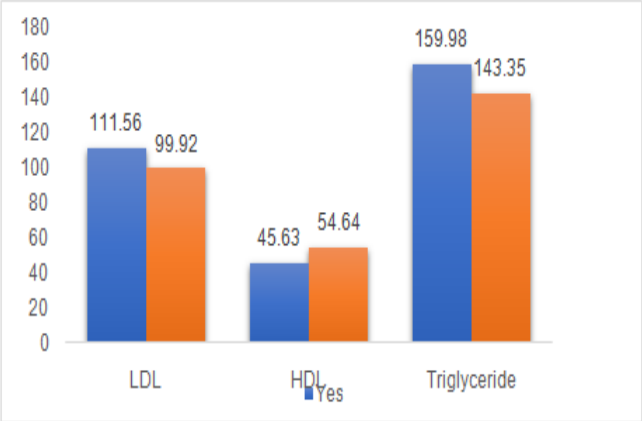

Figure 2: Bar diagram showing metabolic syndrome and Lipid profile

Metabolic syndrome and Serum electrolytes

In cases, with metabolic syndrome, the mean serum sodium levels were observed to be 140.19 ± 2.51(mEq/L) and in cases without metabolic syndrome, it was 137.14 ± 2.11(mEq/L). a statistically significant difference was observed in the mean sodium values in cases with and without metabolic syndrome. No statistically significant difference was observed in the case of serum magnesium and calcium levels in cases with and without metabolic syndrome.

In cases with metabolic syndrome the mean serum potassium level was observed to be 4.37 ± 0.24(mEq/L) and the mean value in cases without metabolic syndrome, it was 4.29 ± 0.21(mEq/L). the mean difference across the values in cases with and without metabolic syndrome was found to be statistically significant.

In cases with metabolic syndrome the mean serum phosphorous level was observed to be 5.37 ± 0.73(mg/dl) and the mean value in cases without metabolic syndrome, it was 5.66 ± 0.87(mg/dl) the

mean difference across the values in cases with and without metabolic syndrome was found to be statistically significant.

In cases,with metabolic syndrome, the mean blood urea level was observed to be 113.80 ± 17.16(mg/dl) and the mean value in cases without metabolic syndrome was 106.87 ± 21.37(mg/dl) the mean difference across the values in cases with and without metabolic syndrome was found to be statistically significant.

	Metabolic syndrome			
Serum electrolytes	Yes	No	T value	P-value
Sodium(mEq/L)	140.19 ± 2.51	137.14 ± 2.11	8.66	<0.001*
Magnesium(mg/dl)	5.43 ± 1.05	5.58 ± 0.87	1.02	0.30
Calcium(mg/dl)	9.56 ± 0.54	9.32 ± 0.76	0.33	0.73
Potassium(mEq/L)	4.37 ± 0.24	4.29 ± 0.21	2.49	0.01*
Phosphorous(mg/dl)	5.37 ± 0.73	5.66 ± 0.87	2.36	0.001*
Urea(mg/dl)	113.80 ± 17.16	106.87 ± 21.37	2.43	0.01*

Table 2: Metabolic syndrome and Serum electrolytes

DISCUSSION

In the present study prevalence of metabolic syndrome was seen in 57.9% of the cases. In **B Poudel.Study**[11]sixty (37.5%) of the chronic kidney disease patients had MS according to modified National Cholesterol Education Program Adult Treatment Program III criteria. In **Yong Un Kang's study**[12]37.93% of the participants with total CKD (n=239,137) had MS (40.04% for abdominal obesity; 34.46% for hypertriglyceridemia; 27.1% for low HDL cholesterol; 62.74% for high blood pressure; and 43.61% for high fasting glucose).In present study, SBP and DBP, waist circumference was found to be significantly higher in cases with metabolic syndrome when compared to those without metabolic syndrome.Study conducted by **Jing Chen et al**[13], C **Kitiyakara et al**[14], and **SeunghoRyu et al**[15]alsofound statistical significance with mean SBP, DBP and waist circumference among patients with MS and without MS (p=0.001).

In our present study, the mean FBS was in cases with metabolic syndrome in the case without metabolic syndrome were found to be statistically not significant. But in study by **Jing Chen et al**[13]and**C Kitiyakara**[14] et al found statistical significance with mean FBS among patients with MS and without MS (p=<0.001).Study conducted by **Jing Chen et al**[13],**C Kitiyakara et al**[14] and **Seungho Ryu et al**[15]found statistical significance with mean creatinine among patients with MS and without MS with (p=0.001) which is in accordance with the present study.

Similar trends in the lipid profile among the patients with CKD with MS and without MS, was observed in study conducted by**C Kitiyakara et al**[14] and**Seungho Ryu et al**[15]in accordance to the present study.

CONCLUSION

The results of the present study demonstrates that the prevalence of metabolic syndrome in non-diabetic CKD individuals is high. There is a progressive increase in metabolic syndrome prevalence with advancing stage of CKD. Future studies should address whether targeted reduction in individual factors of metabolic syndrome like weight reduction, exercise, and other measures to increase insulin sensitivity, as well as interventions that directly target biochemical components of the metabolic syndrome will reduce the risk for CKD in these individuals.

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