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Study of Chronic Viral Hepatitis in Chronic Kidney Disease

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Original Research Article

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Abstract: Chronic kidney disease (CKD) is a major public health problem worldwide. Chronic viral hepatitis caused by hepatitis C (HCV) and B viruses (HBV) carries significant morbidity and mortality globally. Both of these viruses can lead to the development of CKD in many ways. CKD patients having HBV or HCV infection tend to have higher morbidity and mortality rates. However, these associations are not well established and hence the optimal management of CKD associated with HBV and HCV is not well described because of paucity of data. 800 patients constituting 400 CKD cases and 400 non CKD controls were screened for the presence of chronic viral hepatitis seropositivity. Patients were followed up for a period of one year and morbidity during the one year study period was noted. The prevalence of chronic viral hepatitis B and C were assessed and the difference in the clinical course of CKD in the presence and absence of coexisting HBV or HCV infection were studied. The association between clinical characteristics and outcome variables was analyzed. Among the 800 patients, the prevalence of HCV and HBV infection were 5.8% and 2.4% respectively. HCV infection prevalence amongst CKD patients was significantly higher than non CKD patients (3.5% vs. 1.3%, P=0.037). The difference in HBV infection prevalence was not statistically significant between the two groups (7% vs. 4.5%, P=0.129). The prevalence of HBV and HCV infection was higher in later CKD stages, ranging from 28% in CKD stage 3 to 35 and 42% respectively in CKD stages 4 &5. The morbidity among HBV or HCV infected patients with CKD was significantly high (71.4 vs 43.8, p=0.005) (78.6 vs 44.6, p=0.012). HCV infection prevalence was associated significantly with CKD. Both HBV and HCV are associated with increased disease severity of CKD.

Keywords: Chronic, disease, hepatitis, CKD, HBV.

INTRODUCTION

The higher incidence of chronic Hepatitis B virus (HBV) and Hepatitis B (HCV) carriers among the patients with various forms of chronic kidney disease (CKD) tend to support the hypothesis of a pathogenic association between chronic viral infection and CKD. Chronic hepatitis B and C viral infections are etiologically linked to well-defined glomerulopathies. HBV and HCV infections may lead to CKD. However, the association between different types of viral hepatitis and CKD is not well established. CKD patients with HBV or HCV infection carry higher morbidity and mortality rates. The optimal management of CKD associated with HBV and HCV infection is not well defined because of paucity in clinical data

Objectives

- To estimate the prevalence of HBV & HCV infection in CKD patients and to assess the risk for chronic viral hepatitis patients for the development of CKD.
- To assess one year morbidity of patients having CKD and Chronic viral hepatitis B & C.

METHODOLOGY

Study design

This was a case control study for the association between chronic kidney disease and chronic viral hepatitis.

Inclusion criteria

All CKD cases diagnosed by the following criteria:

- Proteinuria (urine protein ≥1+)
- Low estimated GFR (<60mL/min/1.73m^2) computed using Cockcroft-Gault Equation
- Ultrasonographic evidence of CKD.

Exclusion criteria -Acute kidney injury patients

Patients with CKD admitted in Medical College Trivandrum were included in the study after getting their informed written consent. Demographic data, past history and other co-morbidities were also sought. Patients were clinically evaluated and

investigation results were recorded. For the assessment of kidney function, eGFR was computed using the Cockcroft-Gault Equation. The clinical severity of the disease was graded according to proteinuria, eGFR and the treatment modality.

Patients were evaluated with body weight, renal function tests, urine dipstick test, ultrasonography of abdomen etc. The data was collected as a structured questionnaire. Those who meet the inclusion criteria were enrolled as CKD cases and other inpatients in medical wards without CKD were included as controls. Controls were selected in such a way that they match with the cases in terms of the age, sex and presence of comorbidities. All the cases and controls were screened for the presence of chronic hepatitis B or C infection. Clinical severity and treatment status for one year among cases and controls were recorded. Morbidity during the last one year was noted and hospital admission requirement was used as the major morbidity indicator.

Statistical analysis

The data was collected and analysed using statistical tools. Mean, median, percentage sampling were used for quantitative analysis and Statistics Package for Social Sciences, SPSS (version 20) was used for qualitative analysis to derive the values of probability (p value). Chi square test was used appropriately for analysis of variables.

OBSERVATIONS AND RESULTS

Out of the 800 patients studied, the mean age was 51.54 ± 10.89 and 56.9% were males. The age and gender distribution of the study population is depicted in figures 1 and 2

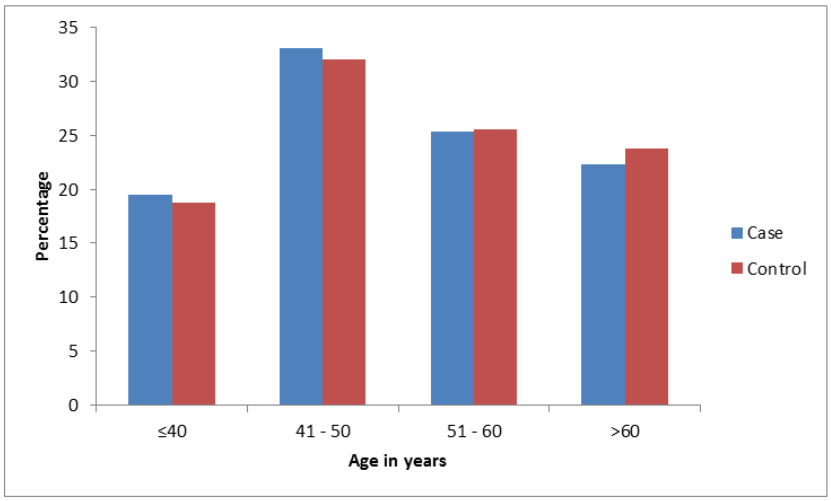

Fig-1: Percentage distribution of patients according to age

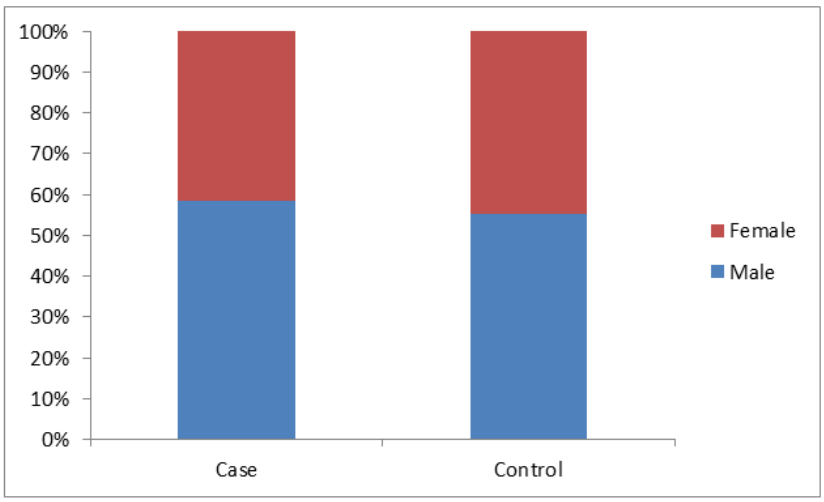

Fig-2: Percentage distribution of patients according to gender

In this study, the maximum prevalence was observed in stage 4 of CKD (56%) followed by stage 3 (31%). The stage wise distribution of CKD stage of the study population is shown in figure 3

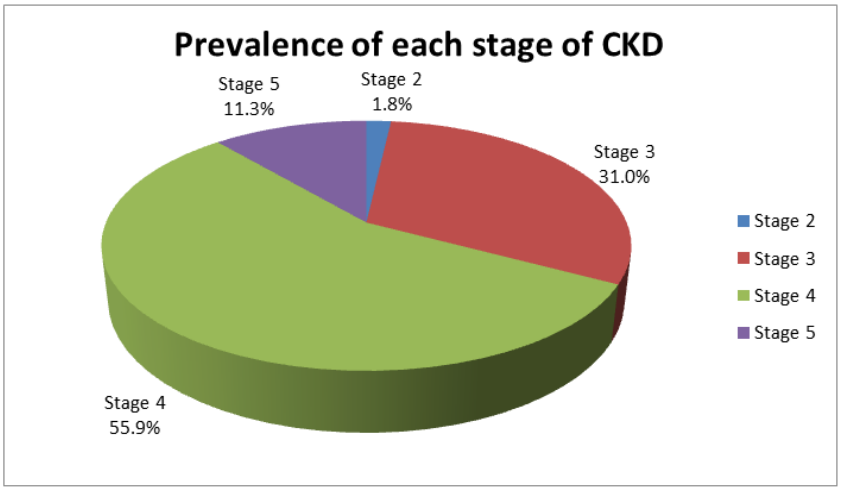

Fig-3: Stage wise prevalence of CKD

Table-1: Prevalence of chronic HBV infection in the study group

	Case		Control		Total	
HBSAg	N	%	N	%	N	%
Yes	28	7.0	18	4.5	46	5.8
No	372	93.0	382	95.5	754	94.3
Total	400	100.0	400	100.0	800	100.0

χ^2=2.307 df=1 p=0.129

In our study the prevalence of HBV carrier state was 5.8% (Table 1).

In our study 8 out of 28 (28.6%) HBSAg positive cases and 8 out of 18 (44.4%) HBSAg positive controls were getting HBV antiviral treatment which suggests the less prevalence of CKD in HBV carriers who are getting antiviral therapy.

In our study the prevalence of HCV infection was 2.4 % (19/800) (Table 2).

Table-2: Prevalence of chronic HCV infection in the study group

	Case		Control		Total	
HCV	N	%	N	%	N	%
Yes	14	3.5	5	1.3	19	2.4
No	386	96.5	395	98.8	781	97.6
Total	400	100.0	400	100.0	800	100.0

χ^2=4.367 df=1 p=0.037 OR =2.865 95% CI for OR=1.022-8.032

In our study 2 out of 9 cases (18.2%) and 3 out of 9 controls (50%) were taking any kind of treatment for HCV infection. So it may be suggested that those taking treatment are having less prevalence of CKD when compared to the other group. In our study the number of HCV infected cases were more in stage 4 and 5 (72%).

One year morbidity status

The cases and controls were assessed for a period of one year mainly for morbidity. The main parameter assessed was the requirement of hospital admission. Morbidity in the cases was significantly higher with respect to the controls.

DISCUSSION

In our study the prevalence of HBV carrier state was 5.8%. Antiviral therapy can be effective against membranous glomerulonephritis and polyarteritis nodosa caused by HBV [1] Mesquita, M *et al.* observed proteinuria recurrence after the discontinuation of antiviral therapy especially lamivudine[2]. In our study 8 out of 28 cases (28.5%) and 8 out of 18 controls (44.4%) were getting HBV antiviral treatment which clearly shows the less prevalence of CKD in HBV carriers who are getting antiviral therapy. HCV infection is a major public health issue, which affects approximately 2.8% of the world's population [3] Mukhopadhyaya A *et al.* stated that the prevalence rates of HCV infection vary widely (range 0.09%–2.02%) [4].

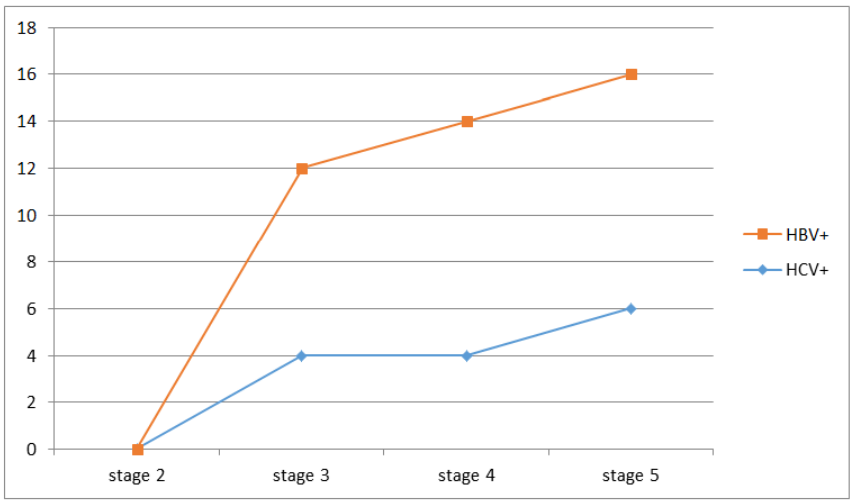

Fig-4: Prevalence of HBV and HCV seropositivity in each CKD stages

Table-3: Morbidity in the study group

No of hospital Admission	Case		Control		Total	
	N	%	N	%	N	%
≥4	183	97.3	5	2.7	188	100.0
<4	217	35.5	395	64.5	612	100.0
Total	400	50.0	400	50.0	800	100.0

χ^2=220.303 df=1 p<0.001

In our study the prevalence of HCV infection was 2.4 % (19/800). In a study by Lee JJ *et al*. the presence of anti-HCV antibody is associated with renal disease progression with a higher rate of positive anti-HCV in those with more severe stages of CKD [5]. In our study 14 out of 19 HCV infected patients had CKD.

According to Lee JJ *et al*. in CKD patients, HCV infection increases the risk of developing ESRD with an estimated 5-year cumulative incidence rate of 52.6% compared to 38.4% in those without HCV infection [6]. This study also reported that HCV infection is an independent risk factor for developing ESRD in our study also the number of HCV infected cases were more in stage 4 and 5 (72%) depicting the higher rate of progression of renal damage. According to Cruzado JM *et al*. antiviral therapy with interferon prevents hepatitis C virus-associated glomerulonephritis by promoting HCV-RNA clearance [7]. In our study 2 out of 9 cases (22.2%) and 3 out of 9 controls (33.3%) were taking any kind of treatment for HCV infection. So it may be suggested that those taking treatment are having less prevalence of CKD when compared to the other group.

According to C. Molino *et al.* and Fabrici *et al.* HBV infection among CKD patients are still associated with higher morbidity and mortality in the absence of antiviral therapy by comparison with the general population [8, 9]. Our study showed that the morbidity among CKD patients having HBV and HCV infection are significantly high (71.4 vs 43.8, p=0.005) (78.6 vs 44.6, p=0.012) when compared to CKD patients not having those infections.

Limitations of the present study

- This study was conducted in a population in a tertiary care centre and may not reflect the exact status in the community. .
- The morbidity assessment for a period of 12 months is a short term for a chronic progressive disease. Hence long term follow up studies may be needed to accurately ascertain the progressive nature and clinical outcomes of this disease and its treatment response.

CONCLUSIONS

- Chronic hepatitis B and C viral infections are etiologically linked to CKD.
- HCV infection, but not HBV infection, was associated significantly with CKD.
- Both HBV and HCV infection are associated with increased disease severity in CKD.
- Antiviral therapy against HBV and HCV may protect against the development of renal failure.
- CKD patients can be taken as high risk group (even without initiation of RRT) for HBV & HCV infection as the mortality and morbidity is high.

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