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Original Article

Pattern of Viral Seromarkers in Patients with Elevated Plasma Creatinine of ≥ 3.5mg/dL

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ABSTRACT

Introduction: Viral seromarkers are expressed in the serum or plasma to indicate viral infection while chronic viral infections may lead to organ failures and also kidneys have receptors as a point of entry for some viruses. This work was therefore designed to characterize viral seromarkers in patients with elevated plasma creatinine of ≥ 3.5mg/dl to determine the possible contribution of viral infections to renal disease as elevated creatinine is an index of renal disease.

Materials and Methods: The study population included 62 patients aged 41 – 75 years with elevated plasma creatinine of 3.9± 0.4 mg/dl as test subjects and 100 age-matched volunteers with normal plasma creatinine of 0.8±0.2mg/dl as control subjects. Anti-HCV, HBsAg, HBeAg, and HIV; HIVp24Ag/Ab were determined in the subjects by ELISA while plasma creatinine was measured by spectrophotometry.

Results: The viral seromarkers obtained in the subjects include:14.5%(09) Anti-HCV; 4.8%(03) p24Ag/Ab; 22.3%(14) HBsAg and 25%(16) HBeAb in the patients with plasma creatinine of 3.9 ± 0.4 mg/dl while 5%(05) Anti-HCV; 2%(02) p24Ag/Ab ; 12%(12) HBsAg and 18%(18) HBeAb were obtained in subjects with plasma creatinine of 0.8±0.2mg/dl.

Conclusions: There was a significant relationship between viral infection and renal disease (suggested by elevated plasma creatinine) as the expression of viral seromarkers of antiHCV, HBsAg, HBeAg, and HIV; HIVp24Ag/Ab in this work were more in patients with plasma creatinine of 3.9 ± 0.4 mg/dl than subjects with plasma creatinine of 0.8±0.2mg/dl while HBsAg and HBeAg were found to be more frequent.

Keywords: Anti-HCV; HBeAb; HBsAg ; HIV; HIVp24Ag/Ab; Plasma creatinine

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INTRODUCTION

Creatinine is non-protein nitrogen which is a product of creatine phosphate as a result of muscle and protein metabolism. It is an index of an abnormal tubular function of the kidney.[1-4] Plasma concentration of creatinine can also be used in the assessment of the glomerular filtration rate of the kidney. It is excreted by the kidney unchanged. Creatinine is haemolytic to bacteria.[1-4] Angiotensin-converting enzyme 2 found on the outer surface of lungs, arteries, heart, kidney, and intestines serves as an entry point for some viruses.[5]

Viral seromarkers are indices of viral infections expressed as either antigen, antibody, or other immune products in the plasma or serum.[6,7] They include anti-HCV an antibody to HCV; HBsAg a surface antigen to HBV; HBeAg an envelope antigen to HBV; HBeAb an antibody to HBV envelope antigen and anti-HIV an antibody to HIV; HIVp24 antigen an antigen to HIVp24 protein while HIVp24 antibody is an antibody to HIV p24 antigen which is a component of the HIV particle capsid.[6,7]

Elevated plasma or serum creatinine is an indication of renal disease. Renal diseases can be caused by infections[8], prolong use of analgesics such as aspirin, acetaminophen, and nonsteroidal anti-inflammatory drugs; complications of diabetes such as diabetic nephropathy; excessive intake of animal protein, fat, and cholesterol may increase microalbuminuria an indication of a decrease in renal function; deposition of IgA antibody on the glomerulus causing IgA nephropathy common cause of glomerulonephritis; iodinated contrast media; long term use of lithium; lupus; Xanthine oxidase deficiency; polycystic disease of the kidneys and toxicity of chemotherapy agents.[8]

This work is therefore designed to characterize viral seromarkers in patients with elevated plasma creatinine to determine the contributions of viral infections to renal disease.

MATERIALS AND METHODS

Study area

This study was carried out in General Hospital Iseyin, Oyo State. Iseyin is located in the Northern part of Oyo state in Nigeria. The study population included 62 patients aged 41 – 75 years with elevated plasma creatinine of 3.9 ± 0.4 mg/dl as test subjects and 100 volunteers with normal plasma creatinine of 0.8±0.2mg/dl as control subjects. They were recruited through General Hospital, Iseyin, Nigeria. The proposal of this work was reviewed and approved by the Research and Ethical Committee of General Hospital, Iseyin, Nigeria. After taking consent, five milliliters of venous blood was collected into a lithium heparinized tube for the extraction of plasma.

Analysis of biological samples

Detection of HIVp24 antigen and antibodies to HIV-1 (groups M and O) and HIV-2 in human serum was determined in the subjects using Bio-Rad Genscreen™ ULTRA HIV Ag-Ab which is a qualitative ELISA kit used for the detection of HIV p24 antigen and antibodies to HIV-1 and HIV-2 in human serum/plasma. Determination of Antibody to HCV (Anti-HCV) was tested using Bio-Rad Monolisa™ Anti-HCV PLUS Version 3 kit by ELISA technique. Detection of Hepatitis B surface antigen (HBsAg) in the test and control subjects was carried out by a one-step MONOELISA AgHBs sandwich ELISA technique using a BIORAD kit. Detection of Antibody to hepatitis B envelope antigen (HBeAb) in the test and control subjects was carried out by a one-step sandwich ELISA technique using a BIORAD kit. Plasma Creatinine was determined calorimetrically in the subjects using the RANDOX kit.

The results of this work were subjected to statistical analysis using IBM SPSS 18.0 (New York) to determine mean and frequency.

RESULTS

The viral seromarkers obtained in the subjects included:14.5%(n=09) Anti-HCV; 4.8%(n=3) p24Ag/Ab; 22.3%(n=14) HBsAg and 25%(n=16) HBeAb in the patients with plasma creatinine of 3.9 ± 0.4 mg/dl while 5%(n=05) Anti-HCV; 2%(n=02) p24Ag/Ab ; 12%(n=12) HBsAg and 18%(n=18) HBeAb were obtained in subjects with plasma creatinine of 0.8±0.2mg/dl (Table1 ; fig. 1).

Table 1: Viral seromarkers in the test and control volunteers

		Test population (n=62)	Control (n=100)
Creatinine Concentration (mg/dl)	3.9 ± 0.4		0.8±0.2
Viral Seromarker	**Anti-HCV**	14.5% (09)	5% (5)
	p24Ag/Ab	4.8% (3)	2% (2)
	HBsAg	22.3% (14)	12% (12)
	HBeAb	25% (16)	18% (18)

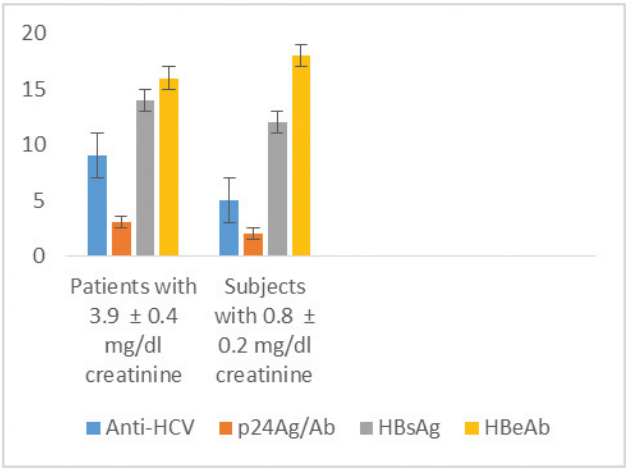

Figure 1: Viral seromarkers in relationship with plasma creatinine in the subjects

DISCUSSION

The viral seromarkers obtained in the subjects include:14.5%(09) Anti-HCV; 4.8%(3) p24Ag/Ab; 22.3%(14) HBsAg and 25%(16) HBeAb in the patients with plasma creatinine of 3.9 ± 0.4 mg/dl while 5%(5) Anti-HCV; 2%(2) p24Ag/Ab ; 12%(12) HBsAg and 18%(18) HBeAb were obtained in subjects with plasma creatinine of 0.8±0.2mg/dl.

Expression of Anti-HCV indicates HCV infection; p24Ag/Ab indicates HIV infection; HBsAg and HBeAb indicate HBV infection. Viral seromarkers of HIV, HCV, and HIV were more in patients with elevated creatinine compared with subjects with normal plasma creatinine can be associated with the fact that Angiotensin-converting enzyme 2 (ACE2) is an enzyme attached to the cell membranes of lungs, arteries, heart, kidney, and intestines. Serum creatinine is used to determine the renal function and has a normal reference interval of between 0.6-1.3 mg/dL.[1,2,9-12] Elevated blood creatinine concentration is a marker

of kidney disease. Elevated plasma creatinine is an indication of decreased renal function.[1,2,9-12]

Infection induced renal diseases causing direct kidney injuries or immune-mediated injuries have been reported. Microbial infections can cause renal injury by direct invasion, or indirectly by immune-mediated mechanisms which can be reflected as glomerulonephritis.[9-12] Clinical manifestations may be acute or chronic depending on the microorganisms, endemic/epidemic nature, and source of infection. Virus, bacteria, mycobacteria, fungus, and protozoa have been implicated in renal diseases.[9-12] Furthermore, the findings can also be explained as follows that the extrahepatic manifestations of chronic hepatitis B virus (HBV) infection include glomerulonephritis.[13,14]

In addition, extrahepatic manifestations and complications of HCV infection also include mixed cryoglobulinemia, lymphoproliferative disorders, and kidney disease.[15-27] Chronic hepatitis C virus infection has been linked with a glomerular disease like mixed cryoglobulinemia, membranoproliferative glomerulonephritis, membranous nephropathy, and polyarteritis nodosa.[15-27] Acute and chronic kidney disease have also been associated with HIV infection but HIV-associated nephropathy has been reduced in the era of antiretroviral therapy.[28]

The most prevalent of the HBV viral seromarkers expressed by the test and control subjects is consistent with the pooled prevalence of HBV in Nigeria of 13.6%[29]; 12.2%[30] and 4.3 to 43.3 percent.[31] Notwithstanding the seromarkers of HBV were more in those with elevated plasma creatinine than subjects with normal plasma creatinine because renal disease especially glomerulonephritis can occur as a complication of viral infection which may be extrahepatic in viral hepatitis.[15- 27] These reasons also hold for the frequency of seromarkers of HIV and HCV.

Hepatitis B envelope antibody is a seromarker of HBV infection. In this study, it was found to be more than HBsAg (another HBV marker) because some individuals might be positive for HBV infection without expressing HBsAg as such individuals will have HBeAb in their serum.[29-31]

CONCLUSIONS

There was a significant relationship between viral infection and renal disease as the expression of viral seromarkers of anti-HCV, HBsAg, HBeAg and HIV; HIVp24Ag/Ab in this work was more in patients with plasma creatinine of 3.9 ± 0.4 mg/dl than subjects with plasma creatinine of 0.8±0.2mg/dl while HBsAg and HBeAb were found to be more frequent.

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