ORIGINAL RESEARCH PAPER

General Medicine

A STUDY OF RENAL AND METABOLIC COMPLICATIONS IN PATIENTS WITH HIV INFECTION

KEY WORDS:

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ABSTRACT

Background: Renal involvement in HIV-infected persons clinically manifests in a variety of ways, including acute kidney injury (AKI), HIV-associated kidney disease, co-morbid chronic kidney disease (CKD), and treatment-related kidney toxicity. Antiretroviral medications can directly or indirectly increase the risk of metabolic abnormalities such as insulin resistance and dyslipidemia. This study was undertaken to study renal and metabolic manifestations in patients with HIV infection.

Objective: To study renal and metabolic manifestations in patients with HIV infection.

Methodology: The present prospective study was an analytical study conducted at tertiary care center, on 50 PLHA patients as per study protocol.

Results: The most common age in study was 31-50 years. In this study among HIV patient's most common renal manifestation was AKI followed by CKD. Metabolic dysfunction was common in the group of HIV patients who are on ART rather than ART naïve group.

Conclusion: This study shows that overall renal manifestations were more common than metabolic manifestations. In this study among HIV patients, the prevalence of AKI was most common followed by CKD, dyslipidemia and dysglycemia. Most common cause of AKI in HIV patients is pre-renal such as hypovolemia, sepsis etc. Co-morbidity associated CKD was the most common cause of CKD in HIV patients. Most of these CKD patients had long term exposure to Zidovudine based and Tenofovir based regimens for 5-10 years. Dyslipidemia and dysglycemia were also common in younger age group of 21-40 years. This is because of long term ART exposure in these patients that causes lipodystrophy and altered glucose metabolism.

INTRODUCTION:

Kidney disease in HIV-infected persons manifests in a variety of ways, including acute kidney injury (AKI), HIV-associated kidney disease, comorbid chronic kidney disease (CKD), and treatment-related kidney toxicity. The burden of CKD and end-stage renal disease (ESRD) remains high in the HIV-infected population. HIV-associated nephropathy occurs less frequently in the era of antiretroviral therapy. Drug-induced (ART and drugs used in Treatment of opportunistic infections) kidney toxicity also remains a concern. Antiretroviral medications can directly or indirectly increase the risk of metabolic abnormalities such as insulin resistance and dyslipidemia.

Metabolic complications which occur in HIV/AIDS patients include dyslipidemia, weight gain, insulin resistance, and glucose intolerance, mineral bone disease, and lactic acidosis. A number of studies are available from the Western world; however, the data from India is meagre. It is imperative to know the extent and the nature of the problem in order to make preventive strategies.

Method:

This prospective study was an analytical and non-randomized study based on cases of 50 PLHIV (People living with HIV). During defined study period, patients who gave consent were selected and enrolled in this study, detailed history was taken and all were clinically assessed for any acute or chronic illness.

Selection Criteria:

1) Inclusion Criteria:

- All PLHIV attending medical department during study period.
- All those patients who gave consent.

2) Exclusion Criteria:

All critically ill patients.
Those who did not give consent.

Recorded information entered in Microsoft excels worksheet. Data has been analyzed and compared by using appropriate statistical test. All the patients fulfilling selection criteria were explained about the purpose of study and a written informed consent was obtained to participate in the study before enrolment. According to pretested Proforma, each patient underwent detailed Generalized and Systemic examination. Hematological, Bio-chemical and Radiological investigations were carried out as per study protocol.

Analysis And Results

Renal dysfunction, dyslipidemia, diabetes mellitus and metabolic syndrome are increasingly seen in PLHIV.

Demographic profile of patients with different manifestations are shown in following table 1. They are categorized according to gender, age, occupation, substance abuse, ART status. All patients included in this study were on Tenofovir based ART regimen.

Table 1 Demographic profile of patients in HIV infection (n=50).

		Total Patients (n= 50)		Patients with AKI (n = 27)		Patients with CKD (n = 15)		Patients with Dyslipidemia (n = 19)		Patients with Dysglycemia (n = 7)	
		No	Perc (%)	No	Perc (%)	No	Perc (%)	No	Perc (%)	No	Perc (%)
Gender	Male	30	60 %	15	55.5%	9	60 %	12	63.2 %	5	71.4 %
	Female	20	40 %	12	44.4%	6	40 %	7	36.8 %	2	28.6 %
Occupation	Semi-professional	12	24 %	4	14.8%	1	6.6 %	2	10.5 %	-	-
	Semiskilled	17	34 %	11	40.7%	5	33.3 %	7	36.8 %	2	28.4 %
	Unskilled	13	26 %	8	29.6%	7	46.6 %	8	42.2 %	4	57.14 %
	Student	2	4 %	1	3.7%	-	-	-	-	-	-
	Unemployed	6	12 %	3	11.1%	2	13.3 %	2	10.5 %	1	14.2 %
Substance abus	Alcohol	10	20 %	10	37.1%	6	40 %	7	36.8 %	3	43 %
	Smoking	6	12 %	7	25.9%	1	6.66 %	4	21.05 %	2	28.5 %
	Tobacco	12	24 %	11	40.7%	4	26.2 %	8	42.15 %	2	28.5 %
	IDU	2	4 %	-	-	-	-	-	-	-	-
	Multiple addictions	14	28 %	-	-	4	26.2 %	-	-	-	-
ART Status	On ART	37	74 %	22	81.4 %	11	73.34 %	16	84.3 %	5	71.4 %
	ART Neive	13	26 %	5	18.6 %	4	26.66 %	3	15.7 %	2	28.6 %

Table 2: Laboratory parameters of patients:

A) Patients With AKI: (n = 27)	
Mean Age	39.92
Male	55.5%
DM	7.4%
HTN	11.1%
Serum creatinine	4.87
Serum calcium	8.43
Cd4 count	198.6 ± 97.8

B) Patients With CKD: (n = 15)	
Mean Age	39.4
Male	60%
DM	44.5%
Duration of HIV (months)	67.27
Mean creatinine	5.60 ± 2.24
eGFR	54.7 ± 39.46
Proteinuria	196.58
Mean CD4	210
ART naïve	26.6%
On ART	73.4%
Hb	7.75 ± 2.77

C) Patients With Dyslipidemia: (n = 19)	
Prevalence	40.1%
Mean age	42.52 ± 8.93
Male (%)	63.1%
Duration of HIV (months)	51.06 ± 34.11
Mean CD4	351 ± 140.63
Mean BMI	27.92 ± 7.72
HTN	36.8%
DM	52.6%
IHD	10.5%
CKD	15.7%
Mean SBP	122.8 ± 16.4
Mean total cholesterol	213.7 ± 32.45
S. TGA	188.96 ± 41.06
S. HDL	34.4 ± 12.64
S. LDL	96.31 ± 52.7
d) Patients with dysglycemia (7):	
FBS	112.69 ± 12.4
Hba1c	7.28 ± 2.41

Above data showed that AKI in HIV population (n = 27) is commonly seen in 30-40 years of group with male preponderance.

Associated co-morbidities such as DM and HTN make these patients more prone to AKI. Low CD4 cell counts were also observed in patients with AKI.

In this study, demographic variables of CKD (n=15) in HIV infected patients showed that mean age of these patients was 39.4 and 60% of them were male population. Co-morbidities such as HTN, DM and HBV infection were associated with CKD in HIV patients. Mean eGFR of the patients with CKD was 54.7±2.24. This shows that most of the patients with CKD in HIV have mild to moderate renal failure (G3a stage). Mean CD4 cell count of CKD was 210 cells/microL.

Duration of HIV was an important factor in development of metabolic dysfunction in HIV patients. This is due to prolonged exposure to ART as well as direct effect of HIV replication leading to oxidative stress and free radical injury. Since metabolic dysfunction in HIV infection is mainly due to prolonged exposure to ART, CD4 count of such patients tend to be on higher side.

Mean BMI of the patients with metabolic dysfunction in the present study was 27.92 ± 7.72. Redistribution of fat and dysglycemia causing central obesity is responsible for higher BMI in the patients with metabolic dysfunction in HIV infection.

Mean fasting blood sugar of dysglycemic HIV patients in the present study was 112.69 ± 12.4. Mean Hba1c of patients with metabolic dysfunction in the present study was 7.28 ± 2.41.

Table 3: Distribution of patients as per co-morbidities.

Types	Total Patients	
	No	Perc (%)
DM	11	22%
HTN	12	24%
IHD	2	4%
CKD	4	8%
HBV	1	2%
Total patients	**30**	**60%**

Table 4: Causes of AKI according to underlying etiology:

Pre-renal causes		No of patients (n=27)	Total (n=27)	Percentage
Hypovolemia/AGE		9	19	47%
Respiratory infection		3		15.7%
Urosepsis		5		26.3%
Multifactorial		2		10.5%
Renal causes				
Clinically GN		1	5	20%
Drug induced	ZLN/ZLE	0		80%
	TLN/TLE	2		

	NSAIDs	1		
	CPT	0		
	Aminoglycoside	1		
Post-Renal causes				
Pyelolithiasis		2	3	66.6%
BPH with cystitis		1		33.3%

Table 5: Causes of CKD

Cause	No of patients	Percentage
DM nephropathy	4	26.6%
HTN nephropathy	5	33.3%
Clinically HIVAN	2	13.3%
MPGN	1	6.6%
Idiopathic CKD in HIV	3	20%

Causes of AKI were categorized in 3 types as shown above. Among them pre- renal causes were most common and were Seen in 70.3% of patients. Following this, 18.5% of patients had renal cause and 3.7% of patients had post-renal cause of AKI. Majority of ART naïve patients were having pre-renal AKI. Among pre-renal causes of AKI, hypovolemia /AGE was the most common cause in 47% of patients. This was followed by other causes as mentioned in table 4. Among renal causes of AKI 80% of patients had drug induced kidney injury and 20%(n=1) had clinically glomerulonephritis. This 1 patient had urinary sediments showing RBC casts, moderate proteinuria and gross hematuria. Since biopsy could not be done in this patient, he was diagnosed as clinically glomerulonephritis. Out of 4 patients with drug induced AKI, 2 patients had exposure to Tenofovir, 1 was due to NSAID and 1 was due to aminoglycoside. Post-renal causes were pyelolithiasis in 66.6% and BPH with cystitis in 33.3% of patients.

HTN nephropathy was the commonest cause of CKD in 33.3% of HIV patients as shown in table 5. Following this, 26.6% of patients had Diabetic Nephropathy, 20% of patients had idiopathic CKD, 13.3% of patients had clinically HIVAN and 6.6% were having MPGN. Renal biopsy was not done in CKD patients, hence the HIV patients who were ART naïve, non-hypertensive, non-diabetic, heavy proteinuria without any signs of fluid overload were classified as clinically HIVAN.

ART with NRTI, NNRTI and PIs are associated with lipid redistribution and obesity that can lead to dyslipidemia.

Dysglycemia was associated with HTN, frank T2DM, IHD, CKD and with ART. ART associated dysglycemia was due to lamivudine induced pancreatitis leading to secondary dysglycemia in 4 patients on TLE.

SUMMARY:

- There were 60% male and 40% female in this study with most common age groups being 31-40 years and 41-50 years. The prevalence of AKI in HIV patients in this study was 57%, CKD was 30%, dyslipidemia was 38% and dysglycemia was 18%. AKI was common in 21-40 years of age group with 55% of them being male. Most common cause of AKI in HIV patients is pre-renal such as hypovolemia, sepsis etc. Comorbidities such as HTN, DM, IHD, HBV were observed in 40.7% of AKI patients. There were 81.5% of AKI patients who were on ART and 18.5% were ART naïve. CKD In HIV patients was common in 21-40 years of age group which is younger than in general population out of which 60% of CKD patients were male. Co-morbidity associated CKD was the most common cause of CKD in HIV patients in which 55.5% of CKD patients had HTN, 44.5% had DM. Mild to moderate renal failure as per eGFR staging was most common renal dysfunction in 40% of CKD patients. Most of these CKD patients had long term exposure to Zidovudine based and Tenofovir based regimens. Metabolic dysfunction was common in the group of HIV patients who are on ART rather than ART naïve group. Dyslipidemia and dysglycemia were also common in younger age group of 21-40 years. This is because of long term ART exposure in these patients that causes lipodystrophy.

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