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Original Research Article

Liver, spleen and renal sonographic abnormalities in adults with HIV/AIDS at Muhimbili National Hospital, Tanzania

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Abstract: Abdominal involvement in HIV/AIDS is quite common. It is second to pulmonary disease. In resource limited countries, Ultrasound is widely available hence if used effectively can help to reduce abdominal complications due to this disease. We therefore aimed at determining pattern of abdominal sonographic abnormalities among patients with HIV/AIDS. This is also a less studied area at our set-up. This was a descriptive cross-sectional study; where by 265 adults with HIV-AIDS, were studied. All patients had CD4 counts taken and underwent abdominal ultrasound examination at Radiology Department, Muhimbili National Hospital. Liver, Spleen and Kidney sonographic findings were documented and analysis was done using SPSS. Abdominal abnormalities were found in 172 (64.9%) patients. The prevalence was significantly higher in patients who were not on antiretroviral therapy (ART) (72.2%) $p<0.01$. Patients who had CD4 count of less than 50/µl were noted to have higher prevalence of sonographic abdominal abnormalities (76.7%) as compared to those with CD4 count of greater or equal to 50/µl (62.6%). Liver was the most affected organ (36.6%). Enlarged kidneys and increased renal echogenicity was more prevalent on patients who were not on ART (8.1%) (p value<0.05). Liver, spleen and renal sonographic abnormalities are common in patients with HIV-AIDS. Patients not on ART and those with CD4 count less than 50/µl have higher frequency of abdominal abnormalities. Enlarged kidneys are more common in patients not on ART. There is a significant relationship between abdominal abnormalities, CD4 count and ART status.
Keywords: HIV/AIDS, CD4, ART, Abdominal Ultrasound.

INTRODUCTION

Over 60% of all people living with HIV are found in Sub-Saharan Africa.[1] One point four (1.4) million people are living with HIV in Tanzania, equating to an estimated HIV prevalence of around 5% [2]. This accounts for 6% of the total number of people living with HIV in sub-Saharan Africa, and 4% of all people living with HIV globally. In 2013, 72,000 people were newly infected with HIV, and 78,000 people died from an AIDS-related illness [3]. (Abdominal involvement in AIDS is quite common. It is second to pulmonary disease [1]. Its frequency is increasing as more and more people are infected with the virus (Human Immunodeficiency Virus) that causes Acquired Immunodeficiency Syndrome (AIDS) [4].

Abdominal Imaging studies they are used in detecting abnormalities, severity, complications, guiding biopsy, follow up and in some cases guide to other diagnostic investigations in determination of specific causes [1, 5]. Ultrasound being also relatively cheap, non invasive, safe and widely available modality [5, 6] can be used in assessing HIV/AIDS related abdominal pathology in resource poor countries. As 70 % of the disease burden is in Sub-Saharan Africa, less studies has been done to explore the Sonographic pattern of HIV related abdominal abnormalities. This study was aimed at establishing magnitude and pattern of abdominal pathologies in patients with HIV by using ultrasonography. The results of this study will be useful to physicians, radiologists and police markers in overall management of patients with HIV disease.

MATERIAL AND METHODS

Formal ethics approval was obtained from the Muhimbili university of Health and Allied Sciences Institutional Review Board (MUHAS-IRB). This was a

descriptive cross sectional study that described the pattern of sonographic abdominal abnormalities in adults with AIDS at Muhimbili National Hospital. The study was conducted for six months, between July and December, 2010. We studied 265 adults from 18 years and above with HIV-AIDS.

Data were collected through structured closed ended questionnaire gathering demographic factors, laboratory variables and Ultrasound variables. Blood samples were collected for CD4 counts investigations. All participants underwent abdominal Ultrasound scan. The ultrasound machine used was PHILIPS HP 5000 (Best, Eindhoven, and The Netherlands). Scanning was performed using broadband curvilinear transducers of 2MHz to 5MHz range. Three organs were examined, liver spleen and kidneys, with the abnormalities detection based mainly on size and echogenicity of these organs. The organs were scanned in longitudinal and transverse planes. Standard criteria were used in defining abnormalities detected; [6]

Hepatomegaly- when longitudinal measurement at midclavicular line>15cm,

Splenomegaly- longitudinal dimension at the level of the hilum >12cm,

Enlarged kidney- longitudinal renal dimension>12cm, Renal parenchyma echogenicity was graded according to the standard method that compare with the echogenicity of the liver with kidneys [7].

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) version 15 for Windows evaluation. Frequency distribution and cross tables were used to tabulate data. Variables were expressed in percentage and comparison between independent and dependent variables were done by Chi squire and Fishers test. P value of < 0.05 was considered statistically significant.

RESULTS

A total of 265 adult patients with HIV- AIDS were studied. Majority of the patients 181 (68.3%) were females. The age range was 18 to 66 years with the mean of 39±9.0 .The CD4 counts ranged from 2 to 199/ µl with the mean CD4 count of approximately 115± 55/µl. One hundred and forty two patients (53.6%) were on Antiretroviral Treatment. Of the 265 patients, 43 (16.2%) patients had a CD4 of less than 50/ µl [Table 1]. One seventy two (64.9%) of 265 AIDS patients had sonographic abdominal abnormalities. Patients who were not on ART had higher prevalence of sonographic abdominal abnormalities 72.2% (90/123) as compared to those who were on ART 57.7% (82/142). The difference was statistically significant, p value<0.01. In addition Participants with CD4 counts below 50/ µl were noted to have higher prevalence of sonographic abdominal abnormalities 76.7% (33/43) as compared to those with CD4 count of greater or equal to 50/ul (62.6%), however the difference was not statistically significant. P=0.076 [Table 2].

Liver was the commonest organ with the ultrasonographic abnormalities. It account for 36.6% (96/265). Spleen and kidney abnormalities accounted for 17.4% (46/265) and 16.6% (44/265) respectively. Based on CD4 counts, a higher prevalence of kidney abnormalities were seen in patients who had a CD4 count of less than 50/ µl, p value <0.01 [Fig 1].

Diffuse hyperechoic liver was observed in 18 (6.8%) while focal/multifocal lesion in liver and kidney were found in 7 (2.6%) and 3 (1.1%) patients respectively. Multifocal splenic lesions were seen in 13 (4.9%) patients. A higher prevalence of multifocal splenic lesion were observed in patients with CD4 counts of less than 50/ µl 14.0% (6/43) as compared to those patients with CD4 counts of greater or equal to 50/ µl 3.2% (7/222), p value <0.01. Furthermore, a higher prevalence of diffuse increase in renal cortical echogenicity was observed in patients with CD4 of less than 50 cells 30.2% (13/43), p value <0.01[Table 3]. Patients who were on ART, shows a lower prevalence of combination of enlarged kidneys with increased renal cortical echogenicity (8.1%) as compared to those who were not on HAART (2.1%). The difference was statistically significant, p value 0.042 [Table 4].

Table 1: Demographic and basic characteristics of the studied population N=265

	n (%)

Age (years)	
18-27	23 (8.7)
28-37	92 (34.7)
38-47	101 (38.1)
48-57	46 (17.4)
58-67	3 (1.1)
Mean Age	39±9.0
Sex	
Female Male	181 (68.3) 84 (31.7)
ART status	
Not on ART	123 (46.4)
CD4 counts <50/ul	 43 (16.2%
Mean CD4 counts	115.7

Table 2: Prevalence of Sonographic abdominal abnormalities among adults with AIDS

	Sonographic abdominal abnormalities n (%)	**Total**	**P value**
ART status			
On ART	82 (57.7)	142	
Not on ART	90 (73.2)	123	0.009*
CD4 Counts			
<50	33 (76.7)	43	
50-199	139 (62.6)	222	0.076**

*X squire * Not on ART versus On ART ** CD4 <50 versus CD4> 50*

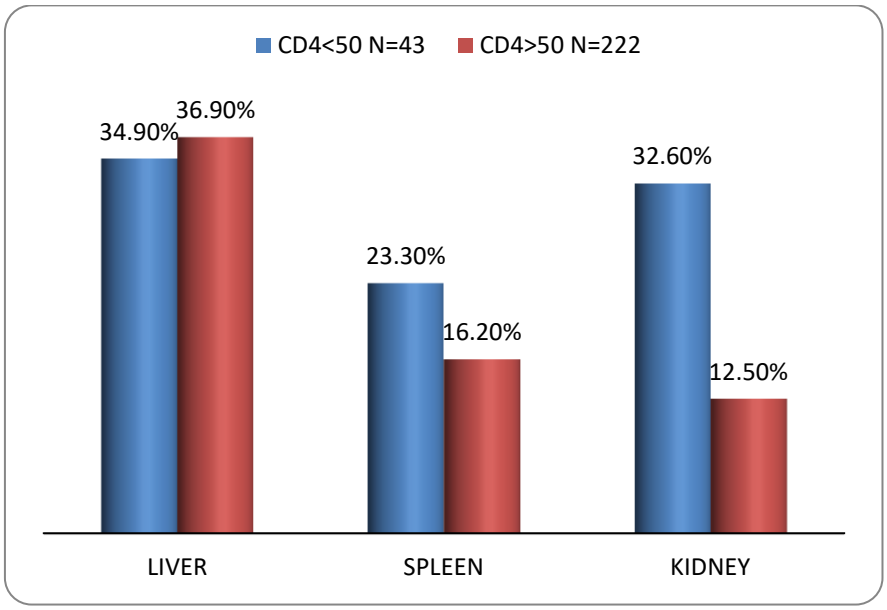

Fig 1: Abnormal pattern distribution in specific organs according to CD4 counts N=265

Table 3: Distribution of the sonographic abdominal abnormalities in relation to CD4

Sonographic findings	**CD4<50**	**%**	**CD4>50**	**%**	**Total**	**%**	**P value**

	N=43		N=222		N=265		
Hepatomegally	11	21.5	70	31.5	81	30.6	0.438
Hyperechoic liver	5	11.6	13	5.9	18	6.8	0.169
Hypoechoic liver	0	0.0	2	0.9	2	0.8	
Focal/multifocal liver lesion	1	2.3	6	2.7	7	2.6	1.000[F]
splenomegally	7	16.3	36	16.2	43	16.2	0.992
Hyperechoic spleen	1	2.3	1	0.5	2	0.8	0.299[F]
Focal splenic lesion	6	14.0	7	3.2	13	4.9	0.003*
Enlarged kidneys	5	11.6	13	5.9	18	6.8	0.169
Increased renal echogenicity	13	30.2	23	10.4	36	13.6	0.0001
Focal multifocal renal lesion	0	0.0	3	1.4	3	1.1	

*X square calculated between CD4 categories. F- Fisher's Exact test; * statistically significant.*

Table 4: Distribution of the types of sonographic findings according to ART status

Sonographic findings	N=265	%	On ART N=142	%	NotonART N=123	%	P value
Hepatomegally	81	30.6	51	35.9	30	24.4	0.042*
Hyperechoic liver	18	6.8	5	3.5	13	10.6	0.023*
Hypoechoic liver	2	0.8	2	1.4	0	0.0	
Focal/multifocal liver lesion	7	2.6	1	0.7	6	4.9	0.052F
splenomegally	43	16.2	18	12.7	25	20.3	0.098
Hyperechoic spleen	2	0.8	1	0.7	1	0.8	0.9F
Focal/ multifocal splenic lesion	13	4.9	6	4.2	7	5.7	0.582
Enlarged kidneys	18	6.8	5	3.5	13	10.6	0.028*
Increased renal echogenicity	36	13.6	16	11.3	20	16.3	0.282
Focal multifocal renal lesion	3	1.1	0	0.0	3	2.4%	
Enlarged kidneys + increased renal cortical echogenicity	13	4.9	3	2.1	10	8.1	0.042* F

*X square On ART versus Not on ART. F- Fisher's Exact test; * statistically significant.*

DISCUSSION

Understanding of pattern of abdominal abnormalities as depicted by ultrasound in AIDS patients is of increasing importance as the number of people with HIV/AIDS is growing worldwide. Treatment for various complications of this syndrome is evolving overtime, people live longer and hence the pattern of the disease has changed. The aim of this study was to determine the pattern of sonographic abdominal abnormalities in adults with AIDS.

The overall prevalence of sonographic abdominal abnormalities in this study was 64.8%. This is comparable to a study done in similar settings at St Paul hospital in Canada by Smith *et al.;* were by the abnormalities were seen in 66.2% [4]. However Igbinedion *et al.;* in Nigeria and Chakraborty *et al.;* in India reported a higher prevalence of 89.9% and 77.8% respectively [5, 8]. Patients who were on ART had a lower prevalence of abnormal sonographic findings (57.7%), as compared to those who were not on ART (73.2%), the difference was statistically significant. This difference points out the risk for abdominal diseases among AIDS patients who are not on ART. It is well known that HAART suppress HIV replication, reduces viral load and as a results a remarkable decrease in AIDS related manifestations. This is supported by the study done in German by Brodt *et al.;* who reported a decrease incidence of AIDS defining abdominal diseases in ART era of more than 70% [9].

Furthermore the prevalence of abdominal abnormalities was higher in patient with CD4 counts of less than 50/ µl (76.7%) as compared to those with CD4 counts of more than 50/ µl (62.6%). However this difference was not statistically significant. In a very

severe immunosuppression (CD4<50), there is depleted body protection mechanism as a result a higher chances for Opportunistic infections and AIDS related malignancy is observed. This is supported by the study done by Piessen *et al.;* who found an increase incidence of opportunistic infections when CD4 falls below 50 cells [10].

A higher prevalence of sonographic abnormalities was seen in the liver (36.6%) as compared to spleen and kidney. This is comparable to the findings of Grumbach *et al.;* and Crum-Cianflone *et al.;* who observe sonographic liver abnormalities in 41% and 31% in Philadelphia and California respectively [11]. Hepatomegally was the most common sonographic abnormality; it accounted for 30.8% of the studied population, This is comparable to findings of Igbidenion *et al.;* and Smith *et al.;* who observe hepatomegally in 39% and 20% in Benin and Canada respectively [4,5]. The finding of hepatomegally was more prevalent in patients who were on ART (35.5%) as compared to those who were not on ART (24.4%). The difference was statistically significant. This could be attributed to HAART related hepatotoxicity. Other sonographic liver abnormalities seen were diffuse increase in echogenicity, focal/multifocal liver lesion and diffuse decrease in echogenicity of the liver that was comparable to other studies. Sonographic renal abnormalities were observed in 16.6% of the studied population. A lower prevalence of sonographic renal abnormalities in AIDS of 5% was reported by Smith *et al.;* in Canada [4], which could be attributed to difference in social demographic factors.

A higher prevalence of kidney abnormalities were seen in patients who had a CD4 count of less than 50 cells as compared to those who had a CD4 of more than 50 cells. The difference was statistically significant. The type of sonographic renal abnormality that was highly prevalent in these patients with low CD4 counts was enlarged kidneys with increased renal cortical echogenicity. It accounted for 4.9% of the studied population. This is comparable to Obajimi et al in Nigeria who observe in 8.4% of studied population [1]. Furthermore it was observed in patients who were not on ART (8.1%) as compared to those who were on ART.

The finding could be attributed to HIV Associated Nephropathy which is a late manifestation of HIV occurring in very severe immunosuppression. ART reduces incidence of HIVAN by its effect of lowering the viral load. Abnormalities in the spleen accounted for 17.4% of the studied population. Sonographic abnormalities noted were splenomegally, diffuse hyperechoic spleen and multifocal splenic lesion that accounted for 16.2%, 0.8% and 4.9% respectively. Splenomegally was the commonest of all the splenic sonographic abnormalities. It accounted for 16.4%. This finding was quite similar to that of Obajimi et al of Nigeria and chakraborty et al of India who reported a prevalence of 14.6% and 15.8% respectively [1, 8]. Multifocal splenic lesions were seen in 13 patients, which accounted for 4.9% of the studied population. This is comparable with the studies done in Nigeria, Canada and India in which the prevalence was reported to be uncommon [1, 4, 5, 11].

CONCLUSION

Liver, spleen and renal sonographic abnormalities are common in patients with HIV-AIDS with the overall prevalence 64.9%. Patients not on ART and those with CD4 count less than 50/µl have higher frequency of liver, spleen and renal sonographic abnormalities. The Liver is the most affected organ in HIV/AIDS followed by kidneys. Hepatomegally affects more patients on ART (35.5%) as compared to those who are not on ART while enlarged kidneys are more common in patients who were not on ARV. This study showed there is significant relationship between abdominal abnormalities seen on ultrasound, CD4 counts and ART status. Further studies are needed in this area to assess the specific aetiologies of the liver, spleen and renal abnormalities in HIV-AIDS.

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