

## Evaluation of PT, APTT, platelets count and CD4 count among HIV patients receiving anti retroviral therapy in White Nile state – Sudan

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### Abstract:

*The aim of this study is to evaluate PT, APTT, platelet count and CD4 in HIV patients. Across sectional study include 40 HIV patients receiving antiretroviral therapy attended to kosti teaching hospital , in white Nile state during April 2016. The PT, APTT, platelet count, CD4 count were analyzed- by using standard technique. The result of PT and APTT in HIV patients receiving anti retroviral therapy were significantly higher (p.value 0.002 ,0.036 respectively), but CD4 count ,platelet count significantly were lower (p.value 0.031 ,0.035 respectively). The PT and APTT were shown a significantly prolonged in HIV patients with CD4 count less than 500 cells/mm<sup>3</sup> when compared to HIV patients with. CD4 greater than 500 cells/mm<sup>3</sup> (p.value 0.016, 0.009 respectively) .*

*Also CD4 count and the platelet counts of HIV patients with CD4 count less than 500 cells/mm<sup>3</sup> were lower, but did not significantly ( $P > 0.058$ ) from those with CD4 count more than 500 cells/ $\mu$ l . PT and APTT are higher in HIV patients receiving ART, but platelet and CD4 were lower.*

**Key words:** HIV, CD4 count, PT, APTT, ART, Sudan

### INTRODUCTION:

Human Immunodeficiency Virus (HIV) infection is a global burden and rapidly spreading. It causes significant morbidity

and mortality by various mechanisms and one among them is coagulation abnormalities<sup>1</sup>. This is quite serious complication especially in late stage of HIV infection<sup>2</sup>. The cause for the defect may be due to the host, drug and viral factors. Host factors include age, IV drug abuse, CD4 count, presence of opportunistic infections, associated malignancies, acquired hypercoagulable state and endothelial dysfunction<sup>3</sup>. Anti-retroviral drugs especially protease inhibitor are also proposed to cause endothelial dysfunction by their effects on metabolism of lipid and glucose<sup>4</sup>. The viral load is also another important determinant<sup>5</sup>. Hepatic damage is caused by virus itself or by the anti-retroviral (ART) drugs that may also contribute to coagulation defects in HIV patients<sup>6</sup>. Platelets play an important role in haemostasis, by forming the primary haemostatic plug following endothelial injury<sup>7</sup>. Platelet count is a diagnostic test that determines the number of platelets in the patients blood. Platelet which are also called thrombocytes are small disk-shaped blood cells produced in the bone marrow and involved in the process of blood clotting<sup>8</sup>. There are normally between 150,000-450,000 platelets in each microlitre of blood. Platelets decrease in HIV infection due to autoimmune destruction, and direct infection of megakaryocytes by virus<sup>9</sup>.

Prothrombin is one of the coagulation factors produced by the liver. One of the final steps of the cascade is the conversion of Prothrombin (factor 11) to thrombin<sup>10</sup>. The Prothrombin time test evaluates the integrated function of the coagulation factors that comprises the extrinsic and common pathways. The international Normalized Ratio (INR) is used to standardize PT result gotten<sup>11</sup>. Activated partial thromboplastin time (APTT), is a screening test that is done to help evaluate a person's ability to form blood clot. It assesses the amount as well as the function of coagulation factors XII, IX, VII, X, V, II and I which are part of haemostasis<sup>12</sup>.

## **MATERIALS AND METHOD:**

The study includes 40 HIV patients receiving antiretroviral therapy attended to Kosti Teaching Hospital, in White Nile State, during April 2016. Blood samples were collected to perform PT and APTT blood sample collected in sodium citrate, while the EDTA was used to determine platelet count and CD4 count.

Prothrombin time (PT), activated partial thromboplastin time (APTT) were performed by the methods described by Dacie and Lewis<sup>13</sup>, while platelet count done by hematological analyzer (Sysmex KXN21). CD4 count was determined using flow cytometry (Partec GmbH, Germany).

## **RESULTS:**

From 40 HIV patients receiving ART, male 29 (59,2 %) and female 11 (40,8 %).

The mean value of PT and APTT significantly increasing in HIV patients receiving ART when comparing with controls (p.value 0.002 ,0.036 respectively), while The CD4 Count and platelet count In HIV infected patients receiving ART were show significant lower (p.value 0.035 ,0.31 respectively) table 1 .

The PT and APTT were show a significantly prolonged in HIV patients with CD4 count less than 500 cells/mm<sup>3</sup> when compared to HIV patients with CD4 greater than 500 cells/mm<sup>3</sup> (p.value 0.016 ,0.009 respectively) , table 2.

Also CD4 count and the platelet counts of HIV patients with CD4 count less than 500 cells/mm<sup>3</sup> were lower, but did not significantly ( $P > 0.058$ ) from those with CD4 count more than 500 cells/ $\mu$ l , table 2.

**Table 1 : The mean value of PT ,APTT ,platelet count and CD4 among HIV patients receiving ART**

Parameter	Negative HIV N =25	HIV PATIENTS N=40	P.VALUE
PT	13.8 ± 1.02	19.32 ±2.590	0.002
APTT	32.64 ± 2.85	48.6 ±7.511	0,036
PLATELET COUNT	278.1± 22.4	150.9 ± .59861	0.035
CD4 COUNT	788.4± 222.05	389.3 ± 201.05	0.031

Mean ± standard deviation

N= number of test

**Table 2: Compression of platelet count, PT and APTT between HIV patients with CD4 > 500 cell \m3m and HIV patients with CD4 < 500 cell \mm3 C**

Parameter	HIV patients with CD4 count< 500 N= 22	HIV patients with CD4 count ≥ 500 N= 18	p.value
PT	2.13± 20.8	15.3 ± 4.06	0.016
APTT	6.13±43.2	38.1 ± 5.23	0.009
PLATELET COUNT	49.28± 148	± 73.5 276.2	0.058

Mean ± standard deviation

N= number of test

## DISCUSSION:

A number of coagulation abnormalities have been described in human immunodeficiency virus (HIV) disease.<sup>14</sup>

HIV infection-associated endothelial dysfunction may therefore result in activation and consumption of coagulation factors and ultimately coagulation defect<sup>15,16</sup>.

Result In our study we found PT and APTT significantly increasing in HIV patients with ART (p.value 0.002,0.036), While significant lower in platelet count and CD4 count (p.value 0.035 ,0.031 respectively). This result also agrees with Omoerge et al 2009<sup>4</sup>.

The WHO new recommendations encourage all countries to initiate treatment in adults living with HIV when their CD4 cell count falls to 500 cells/mm<sup>3</sup> or less – when their immune systems are still strong.<sup>17</sup>

On basis of CD4 count in this study we present, no significant difference ( $p > 0.058$ ) in the platelet count of HIV-positive patients whose CD4 count were  $< 500$  cells/mm<sup>3</sup> and those with CD4 count  $\geq 500$  cells/mm<sup>3</sup> this result agree , with Omoerge et al 2009<sup>4</sup>, while The PT ( $p < 0.016$ ) and APTT ( $p < 0.009$ ) of HIV-positive patients with CD4 count  $< 500$  cells /mm<sup>3</sup> were significantly increased than those of HIV patients with CD4 count  $\geq 500$  cells/mm. The possible explanation is that as the HIV infection progressed, which is characterized by decrease in CD4 count, endothelial activation and possibly liver damage may increase resulting in consumption of blood clotting factors and/or abnormal production of liver dependent clotting factors: resulting in increased PT and APTT, this result supporting by (Myung S Park et al., reported an elevated PT and aPTT in patients with hypercoagulable state)<sup>7</sup>

## **CONCLUSION:**

HIV infected individuals can be screened for coagulation defects with these basic parameters and if any abnormality found should be evaluated further. Since the coagulation defects become more severe as the disease advances, PT and APTT are higher in HIV patients receiving ART but CD4 count and platelet lower in this patient.

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