



STUDY OF CHANGES IN PLATELET COUNT, PROTHROMBIN TIME AND ACTIVATED PARTIAL THROMBOPLASTIN TIME IN HIV POSITIVE PATIENTS

Pathology

Dr. Manushi J. Parekh

Senior Resident

Dr. Dipali H. Bhatt Senior Resident

Dr. Jitendra Chavda Associate Professor

Dr. Shaila Shah Ex-Professor and HOD

ABSTRACT

Aims And Objective: This study was conducted to assess % reduction in platelet count, prolongation of prothrombin time, activated partial thromboplastin time and relationship between CD4 count and changes in platelet count, prothrombin time and activated partial thromboplastin time. **Material And Methods:** Cross-sectional study was done on newly diagnosed HIV positive patients, attending ART center, Sir Takhtasinhji General Hospital, Bhavnagar in duration of one year from the ethics committee approval. **Inclusion Criteria:** Newly diagnosed HIV positive patients, age >18 years. **Exclusion Criteria:** All patients who have taken post-exposure prophylaxis.

- History of previous ART treatment.
- Drugs like aspirin, warfarin, heparin causing alteration in PT and aPTT and platelet count.
- Patient with bleeding disorder like hemophilia.
- Patient with liver disease.

Results: Out of total 244 patients, 190 patients had CD4count (<200 cells/ μ L) and 54 patients had CD4count ($\geq$ 200 cells/ μ L). From the 190 patients 36.3%, 86.3% and 94.2% showed reduction of platelet count, prolongation of prothrombin time and activated partial thromboplastin time respectively. **Conclusion:** Thrombocytopenia, prolonged prothrombin time and activated partial thromboplastin time is present in 28.7%, 68% and 74.6% patients respectively. Regular measurements of basic coagulation parameter could help to determine which patients are at greatest risk of disease progression, allowing these patients to be identified for closer monitoring or therapeutic interventions.

KEYWORDS

HIV positive, Platelet count, Prothrombin time, Activated partial thromboplastin time

INTRODUCTION

Acquired Immunodeficiency Syndrome is the second leading cause of death in men between 25 and 44 years of age and the third leading cause of death in women in this age group. There are about 34 million people living with HIV, of whom 70% are in Africa and more than 20% in Asia; the prevalence rate of infection in adults in Sub-Saharan Africa is more than 8%. It is estimated that 2.5 million people were newly infected with HIV in 2011 and 1.7 million deaths were caused by AIDS.¹

A variety of coagulation abnormalities is seen at every stage of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) and often pose a great challenge in the comprehensive management. These manifestations also reflect the underlying immune status if interpreted cautiously, especially if the patient is on regular follow-up. They may cause symptoms that are life-threatening and impair the quality of life of these patients.²

Hence, this study was conducted as there is no information regarding the coagulation abnormalities and the probable interpretation of the same in population in Bhavnagar, using suitable investigations. Therefore, this study presents preliminary data regarding coagulation abnormalities. It is also tried to evaluate the relationship between various coagulation abnormalities and CD4 cell counts in a hospital-based cohort of newly diagnosed HIV- infected adults attending our ART Centre.

AIMS AND OBJECTIVE

AIMS:

- To analyze alteration in platelet count, prothrombin time and activated partial thromboplastin time in HIV positive patients.

OBJECTIVE:

- To assess % reduction in platelet count.
- To assess prolongation of prothrombin time and activated partial thromboplastin time.
- To assess relationship between CD4 count and changes in platelet count, prothrombin time and activated partial thromboplastin time.

MATERIAL AND METHODS

The study was conducted in newly diagnosed HIV positive patients, attending ART center, Sir Takhtasinhji General Hospital, Bhavnagar according to following inclusion, exclusion criteria, after getting permission from Ethics Committee.

Inclusion Criteria:

- Samples from all newly diagnosed HIV positive patients.
- Age >18 years.

Exclusion Criteria:

- All patients who has taken Post-exposure prophylaxis.
- History of previous ART treatment.
- Drugs like aspirin, warfarin, heparin causing alteration in PT and aPTT and platelet count.
- Patient with bleeding disorder like hemophilia.
- Patient with liver disease.

Study Type:

Cross-sectional study.

Sample Size:

All newly diagnosed HIV positive patients from ART Centre, Sir Takhtasinhji General Hospital, Bhavnagar within the duration of one year After Ethics committee approval.

After taking history blood samples were collected in the ART Centre and sent to central pathology laboratory of Sir Takhtasinhji General Hospital, Bhavnagar, for further tests.

RESULT AND ANALYSIS

Comparison of all three parameters with CD4 cell count

Parameter	Values	CD4count <200 cells/microliter (n=190)	CD4 count $\geq$ 200 cells/microliter (n=54)	Statistical test	p value
Platelet count	Reduced (<150 x 10 ³ /Cmm)	69	01	2-17.54	P<0.01

	Normal (150 x 10 ³ /Cmm -400 x 10 ³ /Cmm)	121	53		
Prothrombin Time	Normal (11-16 sec)	26	52	2-5.72	P<0.01
	Prolonged (>16 sec)	164	02		
Activated partial thromboplastin time	Normal (26-40sec)	11	51	2-18.01	P<0.01
	Prolonged (>40sec)	179	03		

Chi-square test was applied and p value of <0.01 is considered significant.

Out of total 244 patients, 190(77.8%) patients had CD4 count <200 cells/microliter and 54(22.2%) patients had CD4 count $\geq$ 200 cells/microliter. From the 190 patients with CD4 count <200 cells/microliter 69(36.3%) showed reduction of platelet count (<150 x 10³/Cmm), 164(86.3%) patients showed prolongation of prothrombin time (>16sec), 179 (94.2%) showed prolongation of activated partial thromboplastin time (>40 sec). From the 54 patients with CD4 count $\geq$ 200cells/microliter 01(1.8%) showed reduction in platelet count (<150 x 10³/Cmm), 02(3.7%) showed prolongation of prothrombin time (>16 sec), 03(5.5%) showed prolongation of activated partial thromboplastin time (>40 sec). Hence, Patients with CD4 count <200 cells/ microliter showed more derangement of coagulation parameter than patients with CD4 count >200 cells/microliter.

DISCUSSION:

Comparison of mean and standard deviation of platelet count, prothrombin time and activated partial thromboplastin time with other studies

Study name	Mean Platelet Count (Platelet count/L)	Mean Prothrombin Time (seconds)	Mean Activated partial thromboplastin time (seconds)
R Thulasi Raman ³	231 x 10 ⁹	18.23	41.7
Okoroiwu IjeomaLeticia ⁴	157 x 10 ⁹	19.56	42.86
Our Study	229.5x 10 ⁹	16.9	40.8

R Thulasi Raman et al³ did study of basic coagulation factors in HIV positive patients in correlation to CD4 count and ART status and concluded mean platelet value 231 x 10⁹/L, mean prothrombin time 18.23 seconds and mean activated partial thromboplastin time 41.7 seconds. Okoroiwu Ijeoma Leticia⁴ did the correlation of values of CD4 count, Platelet count, PT, APTT, Fibrinogen and Factor VIII among HIV positive patients and concluded mean platelet value to be 157 x 10⁹/L, mean prothrombin time to be 19.56 seconds and mean activated partial thromboplastin time to be 42.86 seconds. Our study showed mean platelet value 229.5 x 10⁹/L, mean prothrombin time 16.9 seconds and mean activated partial thromboplastin time 40.8 seconds. R Thulasi Raman et al⁵ including patients taking ART our study included ART naïve patients.

In our study, decrease in platelet count, prolongation of PT and aPTT was greater in patients with CD4 count <200 cells/microliter than patients with CD4 count $\geq$ 200 cells/microliter was similar to the findings of study of basic coagulation factors in HIV positive patients in correlation to CD4 count and ART status done by R Thulasi Raman et al³. Prolongation of PT and aPTT in patients with CD4 count <200 cells/microliter than patients with CD4 count $\geq$ 200 cells/microliter was also similar to the findings of Correlation of CD4 count with platelet count, prothrombin time and activated partial thromboplastin time among HIV patients in Benin city, Nigeria by R Omoregie et al⁸.

In present study, prothrombin time and activated partial thromboplastin time showed p value <0.01 with Chi-square 2 test, so there is significant correlation with CD4 cell count. Platelet count also showed p value of <0.01 with Chi-square 2 test. So there, significant correlation between coagulation parameter studied in this study and CD4 cell count.

HIV infection is associated with endothelial dysfunction and liver damage. Both endothelial dysfunction and liver damage can result in coagulation defects. It is therefore expected that as the HIV infection progresses, the coagulation abnormalities will increase⁵.

Impaired thrombopoiesis and production of anti-platelet antibodies

have been suggested as possible mechanisms by Karpatkin et al., 2002⁶. Impaired thrombopoiesis can result from infection of megakaryocytes by HIV, because megakaryocytes possess CD4 and CXCR4, which are known receptors for HIV, and various megakaryocytes lines are infectable with HIV, by Najen & Rain 1994⁷.

The PT and APTT in HIV patients were significantly higher than the values obtained in HIV Negative controls ($P < 0.01$) which also agrees with the works of Omoregie et al., 2009⁸, who reported a significant increase in PT and APTT among HIV positive patients. HIV infection is associated with endothelial damage, which can result in activation of coagulation pathways and consumption of clotting factors Jenkins et al., 1991⁹. Also, Lupus anticoagulant (LA), anticardiolipin antibodies (CL) and Liver damage are seen in HIV infected patients. All these (Damaged endothelium, LA, aCL and Liver damage) can affect PT and APTT Values observed among HIV patients Ehmam et al., 1997¹⁰.

CONCLUSION:

From our analysis, there was a change in the coagulation parameter as the HIV infection progressed and our findings are consistent with those of other studies. Thrombocytopenia is present in 28.7 % patients. Prolonged prothrombin time is present in 68% patients. Prolonged activated partial thromboplastin time is present in 74.6% patients. Regular measurements of basic coagulation parameter could help to determine which patients are at greatest risk of disease progression, allowing these patients to be identified for closer monitoring or therapeutic interventions.

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