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Original Research Article

To Study Correlation of Oxidative Parameters and CD4 Count in HIV Patients Before and After 3 Month of HAART

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Abstract

Background & Method: The aim of this study is to study correlation of oxidative parameters and CD4 count in HIV patients before and after 3 months of HAART. Hematological profile and CD4 count were collected from routine investigations done during the visit in HIV OPD for 200 participants, before beginning of treatment and following after 3 months of starting HAART. Oxidative parameters like Total antioxidant capacity (TAC), nitric oxide (NO) and vitamin E were done in first 100 participants from the above 200 participants, before beginning treatment and following after 3 months of starting HAART.

Result: there was significant improvement in Total Antioxidant count and vitamin E levels with CD4 levels(CD4 ≤350 and CD4>350).Also the haematological parameters like haemoglobin,WBC count improved after 3 months of HAART.

Conclusion: HAART is indispensable as these individuals are in danger and risk of progression of disease and death. In this manner screening for clinically important hematological parameters preceding to initiation of HAART and also during HAART must be prioritized. Also other factors should be considered as gender based risk, nutritional status and other contributing components responsible for immune suppression. Highly significant correlation is seen with hemoglobin and CD4 count, as Hb increases there is also increase in CD4 count. Along these lines of screening of hematological parameters before and during treatment is very important so as to intervene where the abnormalities would be potentially reversed. Randomized controlled trials on a big population taking HAART is necessary to affirm the causal pathway between HIV burden, hematological variations and clinical outcome.

Keywords: Oxidative, CD4, HIV & HAART.

Introduction

HIV infection is regularly connected with a hematopoietic framework [1]. Disorders of the hematological framework incorporate, anaemia, leucopenia, thrombocytopenia which may be the result of HIV infection or medication therapy impacts (adverse effects) [2]. HIV infection attacks and assaults significant human resistant cells, for example, T helper cells, macrophages and dendritic cells(with CD4 receptors), that cause

immunodeficiency. Continued immune system failure (low CD4 count) leads to immunodeficiency syndrome (AIDS), making patient susceptible to opportunistic infections and malignancy.

The human immunodeficiency virus (HIV) was obscure until the mid-1980. First clinical case observed was in 1981 in the United States. Since that time a large number of people have been infected in an overall pandemic. HIV infection resulted in destruction of the immune system further landing into AIDS, where HIV infected people are in danger of death because of life threatening infections and neoplastic outcomes of the inescapable complications of AIDS [3]. HIV is thought to have started in non-human primates in sub-Saharan Africa and was moved to people (Zoonosis) late in the nineteenth century, [4] most likely through introduction to primate blood. The earliest retrospectively described case of AIDS is accepted to have been in Norway, in 1966.

AIDS was first clinically observed between late 1980 and early 1981 in U.S. Drug users and gay men with no cause known for impaired immunity showed manifestations of Pneumocystis carinii pneumonia (PCP) and uncommon skin malignant growth called Kaposi's sarcoma (KS) [4]. Alerting to this U.S. Centre for Disease Control and Prevention (CDC), framed task force to monitor the outbreak. Subsequent to bizarre manifestations introducing in patients, the CDC team named the condition Acquired Immune Deficiency Syndrome (AIDS) [5] in July 1982 meet. Around the world in 2016, there were around 37 million individuals living with HIV, around 1 million AIDS-related deaths and 1.8 million new HIV infections. 70 percent of those living with HIV, newly infected or dying from HIV were from sub-Saharan Africa and notably in eastern and southern Africa. There are an expanding number of nations who are accomplishing epidemic control, India is one of them. India is the third most burdened nation of HIV disease in the world [6].

Materials & Method

This study was conducted at NSCB Medical College, Jabalpur. During the study, 200 HIV positive individuals were incorporated by consecutive and convenience sampling after taking consent. During the study confidentiality was maintained. Participants were reassured that they will be given standard care and will not be burdened for extra investigations. Participants included in the study were HIV positive, of age 18-60 years, of either sex, clinically stable, not started HAART and who were ready to take part in the study. Participants excluded from the study includes those with chronic diseases like diabetes, Tuberculosis, liver and kidney disease, additionally patients on chemotherapy, steroid treatment or taking any antioxidant vitamins.

Hematological profile and CD4 count were collected from routine investigations done during visit in HIV OPD for 200 participants, before beginning treatment and following after 3 months of starting HAART. Oxidative parameters like Total antioxidant capacity (TAC), nitric oxide (NO) and vitamin E were done in the first 100 participants from the above 200 participants, before beginning treatment and following after 3 months of starting HAART.

Principle of automated analyzer

Automated CBC analyzer is computerized highly specialized equipment. It determines size and volume of the cell, differentiates WBC cells into neutrophils, lymphocytes and mixed cells. It aspirates the required quantity of blood, quantifies, classifies and describes cell population using electrical impedance technique. In this technique blood cells pass through aperture, as each cell passes through aperture, a change in electrical resistance occur generating a voltage pulse. Number

of pulses during a cycle corresponds to number of cell counted whereas amplitude of each pulse directly proportional to the cell volume.

Results

Table 1: Age

Age	Male	Female	P Value
18-30	41	19	0.014319
31-40	53	13	
41-50	39	09	
51-60	23	03	
Total	156	44	

In our study among 200 subjects, 156 are male and 44 are female. The chi-square statistic is 5.425. The *p*-value is 0.014319. The result is significant at $p < .05$.

Table 2: Oxidative parameters of HIV subjects before and after HAART

Parameters		Comparison of parameters
	Before HAART	After HAART
Nitric oxide level µmol/L	32.09±3.46	6.09±2.93***
Total-antioxidant level (TAC)mmol/L	0.73±0.29	0.93±0.18***
Vit-E level µg/ml	4.41±0.89	5.36±0.26*

Data presented as group mean ± SD, Significantly different:*p<0.05, **p<0.001, ***p<0.0001 Table showing comparison of oxidative parameters, Nitric oxide, TAC and vitamin E.

As we can see from the above table there was significant decrease in oxidative stress parameter of nitric oxide. And there was significant increase in anti- oxidant parameters of total anti-oxidant count and vit E levels.

Table 3: Hematological parameters before and after HAART

Parameters	Before starting HAART Mean ± SD	After starting HAART Mean ± SD	P value
Haemoglobin (g/dl)	11.23 ±1.67	12.50± 1.09	< 0.00001
WBC(10^3/micL)	3.63± 1.48	4.17 ±1.25	
Neutrophil(10^3/micL)	2.48 ±2.66	1.97± 1.73	
Lymphocyte(10^3/micL)	2.78± 0.38	2.98± 1.02	
MCV(fl)	83.69± 1.47	104.9± 1.96	
Platelets(10^3/micL)	234.73± 41.88	236.97± 49.37	
CD 4 cell/micL	264.81 ±159.94	361.68± 141.05	

r- Correlation coefficient between +1& -1. Significantly different:
*p<0.01,**p<0.001,***p<0.0001

There is significant improvement in the hematological parameters of Hemoglobin, WBC count, neutrophils and CD4 cell count after 3 months of instituting HAART in HIV patients. The chi-square statistic is 138.1026. The *p*-value is < 0.00001. The result is significant at $p < .05$.

Discussion

In AIDS, trademark is the particular consumption of CD4+ T partner cells. The main lab finding considered is the degree of CD4+ White blood cell consumption, when ideas are made in regards to treatment with antiretroviral medications or anti-infection agents to be given to

forestall artful contamination. Select patients based on CD4+ White blood cell count, as well as the presence of viral load [7].

There are various examination proceeding to find markers for HIV. Lipid peroxidation is viewed as one of the biomarkers to assess oxidative pressure status in human sicknesses, including HIV. Comparatively in our review we are endeavoring to find boundaries like all out cell reinforcement level, nitric oxide, vitamin E, on the off chance that can be used as markers for HIV patients.

Antiretroviral treatment plays a significant part in forestalling consumption of CD4+ cell. It hinders viral replication and causes speedy increase in CD 4 cell count [8&9]. In our task, mean gauge CD4 level is 263.20 ±160.10 and 19% subjects were with CD4 <200mm3. Different examinations in India exhibited 89.2% cases with benchmark CD4-Lymphocyte count < 200 cell/mm3 [10]. This variety may be a result of selection of patients during study, who might be ahead of time stage during determination. In our undertaking mean CD4 count before and after HAART is 263.20 ±160.10 and 360.40± 140.90 respectively. There is profound increase in CD4 count ($p<0.0001$) after HAART. Comparable consequences of exceptionally critical expansion in CD4 White blood cell count after early commencement of HAART has been exhibited by Bajpai etal and Smith etal. [11,12,13]

Conclusion

HAART should be started as early as possible in HIV patients based on CD 4 counts to halt the progress of the disease. Screening for clinically important hematological parameters preceding to initiation of HAART and also during HAART must be prioritized. Also other factors should be considered as gender based risk, nutritional status and other contributing components responsible for immune suppression. Highly significant correlation is seen with hemoglobin and CD4 count, as Hb increases there is also increase in CD4 count. The oxidative stress is reduced and anti- oxidant parameters increase after commencement of HAART . However , more studies need to be done on larger population stating the effect of HAART on oxidative parameters. Along these lines screening of hematological parameters before and during treatment is very important so as to intervene where the abnormalities would be potentially reversed. Randomized controlled trials on big population taking HAART is necessary to affirm the causal pathway between HIV burden, hematological variations and clinical outcome.

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