

The Impact of Highly Active Antiretroviral Therapy on CD4 + T Cell Count in Patients with Adult HIV Disease

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Abstract: *Acquired immune deficiency syndrome is a disease that affects humans and primates. CD4 T cells are primary targets of Human Immune Deficiency Virus (HIV). The progression of the disease can be monitored indirectly by the change in CD4 counts. The CD4 counts are the predictors of disease progression and to plan the necessary treatment even though there are other parameters available. This gives us an idea of expectation of an opportunistic infection, thus enabling us to prevent morbidity and mortality arising from this disease. We are analysing the outcome of treatment with HAART in patients with adult HIV disease using CD4 count as a reference.*

Keywords: HIV, CD4 count, opportunistic infections, HAART

1. Introduction

The dreadly disease acquired immune deficiency syndrome appeared first around 1970 [1]. The disease had not been recognised until in the early 80s when the syndrome of immune deficiency was found to be widely prevalent among homosexual and IV drug abusers. [2]

CD4 helper cells play a major role in the body's immune system. Nowadays the disease progression and the emergence of opportunistic infections are predicted by CD4 T helper cell counts [3]. The CD4 cells help to recognise the foreign agents and with the help of other T cell lineages tend to contain the infection and eliminate the infective agents [4][5]. The CD4 cells are undoubtedly much reduced in number with advanced disease and this correlation of CD4 cells and Acquired Immune Deficiency Syndrome (AIDS) progression have been studied elaborately by researchers [6][7]. By destroying the CD4 cells, HIV gain access to the body without any resistance if at all and cause a varied syndrome.

Many of the studies have shown an inverse relationship with CD4 cells and viral load [8]. The antiretroviral drugs by eliminating the virions tend to increase the CD4 cells indirectly and this has been proved to a large extent [9]. The invention of Highly Active AntiRetroviral Therapy (HAART) has promising effects in modulating the CD4 count and decreasing the incidence of opportunistic infections especially tuberculosis. [10]

2. Aims of the Study

- 1) To determine the effect of HAART on CD4+ T cell count in patients with proven Adult HIV disease
- 2) To determine the sex wise change in CD4 count in patients receiving HAART therapy.

3. Materials and Methods

Study design: Prospective Observational Study

Inclusion Criteria

All patients with Adult HIV Disease (according to World Health Organisation classification criteria). Patients taking anti-tuberculous drugs along with HAART

Exclusion Criteria

Children (Subjects under 13 years of age)

This study was conducted on the patients who attended the ART centre at Tiruvannamalai Medical College Hospital between the period of October 2016 and August 2017. The study population consisted of all patients with adult HIV disease (according to World Health Organisation classification criteria) [11].

A total of 58 patients were registered for the study but two of them died during the course of therapy. The net total number of subjects are 56. Among them 43 were males and 13 were females. A chart was prepared with details regarding initial CD4 count, follow up CD4 count, opportunistic infections at the time of presentation, type of HAART therapy and the pre and post therapy body weight.

The diagnosis of AIDS was made using WHO criteria for Adult HIV disease and ELISA test for HIV I&II. The presence of opportunistic infections were not considered to be interfering with the study and infact they served as prognostic indicators for the HAART.

The initial and follow up CD4 counts were done at atleast six months interval.

4. Statistical Analysis

The results are inferred on the basis of statistical tools viz., 'Z' test and students 't' test.

5. Observation and Results

A total of 56 patients were studied. Out of the 56, 43 are males and 13 were females.

Table 1: Mean age of Male and Female sub groups

Age Group	Male	Female	Total
20-29	5	3	8
30-39	23	8	31
40-49	8	0	8
50-59	5	2	7
60-69	2	0	2
Total	43	13	56
Mean	39.4	35.8	38.6
SD	10.1	9.5	10
Z	1.17		
Significance	P>0.05		

The mean age of male patients were 39.4 +/-10.1 and the mean age of female patients were 35.8 +/- 9.5. The mean age of the total study population is 38.6 +/- 10. This table shows that the mean age of male and female sub groups were comparable and the difference is not statistically significant

Table 2: Comparison of Mean CD4 count in Males

CD4 Count	Male	
	Initial	Follow Up
0-100	21	4
101-200	14	7
201-300	4	12
301-400	2	12
401-500	2	4
501-600	0	2
601-700	0	2
701-800	0	0
Total	43	43
Mean	133.7	294.2
SD	108.9	148.5
Z	5.7	
Significance	P<0.0001	

In the male subgroup the mean CD4 count at the time of presentation is 133.7 and the mean CD4 count after follow up is 294.2. In this table the mean CD4 count before and after therapy were compared and the difference is statistically significant (P < 0.0001)

Table 3: Comparison of Mean CD4 count in Males

CD4 Count	Female	
	Initial	Follow Up
0-100	8	1
101-200	3	1
201-300	1	3
301-400	0	4
401-500	0	0
501-600	1	2
601-700	0	1
701-800	0	1
Total	13	13
Mean	126.9	373.7
SD	142.3	200.6
T	3.61	
Significance	P<0.01	

In the female subgroup the mean CD4 count at the time of presentation is 126.9 and the mean CD4 count after followup is 373.1. In this table the mean CD4 count before and after therapy were compared and the difference is statistically significant (P < 0.01)

Table 4: Comparison of Mean CD4 count in-toto

CD4 Count	Total	
	Initial	Follow Up
0-100	29	5
101-200	17	8
201-300	5	15
301-400	2	16
401-500	2	4
501-600	1	4
601-700	0	3
701-800	0	1
Total	56	56
Mean	132.1	312.5
SD	116.2	163.5
Z	6.7	
Significance	P<0.0001	

In total, the mean CD4 count at the time of presentation is 132.1 and the mean CD4 count after followup is 312.5. In this table the mean CD4 count before and after therapy were compared and the difference is statistically significant (P < 0.0001)

6. Discussion

The Current study aimed at finding the correlation between CD4 count and HAART and the change in CD4 count after HAART. However there were sex related change in the subjects with respect to age. The change in CD4 count in the total subjects without doubt has been noticed.

The difference between the male and female subjects was not statistically significant and the overall increase is seen in both sexes. Most of the previous studies evaluated the increase in CD4 count with relation to sex and also to viral load. With the available resources the study involves both the sex correlation and independently. The clinical importance of HAART is related to its impact on the CD4 count as well as the well being of the patient. In this study it was found that the mean age of seeking medical advice is between 36.1 – 41.1 years. There is no sex difference in presentation of the disease (p > 0.05). From the statistics it is understood that the mean CD4 count at the time of presentation was 133.7 in males and 126.9 in females. This when compared to the normal CD4 count is much less. It is also noted that the subjects presenting with a very low count initially, after HAART, show improvement in the CD4 count and the magnitude of the opportunistic infections.

The mean increase of the count when the total subjects are taken is also significant (Z – 6.7). The mean count after therapy was 294.2 in males and 373.1 in females. There is a moderate difference in the increase of cells between the sexes can be noted. Even though the initial count is very low in females when compared to males the response to HAART is good for females than in males. The males also show a rise in count but not to the extent of females. Castagna et al

in their study showed that stopping HAART resulted in gradual decline in the number of CD4 cells [12]. However this study does not include the individuality of antiretroviral drugs. The drugs used are combinations of individual agents.

While analysing the data it can be known that the number of subjects in the 0 -100 CD4 count group initially showed good response to therapy.

There are also decline in the number of cells in few subjects. It

can be noted that these subjects presented with very low CD4 count at the beginning.

These findings show the definitive impact of HAART in increasing CD4 cells in AIDS patients.

7. Conclusion

Majority of the AIDS patients present with a low CD4 count especially the females. The females show a dramatic improvement in the CD4 count after HAART when compared to males even though they present with a very low count initially. The mean age of presentation of the disease for both males and females is around 37 years. There is a definite increase in the CD4 cell count after initiation of HAART.

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