Research Article

A study of effect of highly antiretroviral therapy on immunological profile with special references to pediatric HIV patients

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Abstract

Introduction: India harbors world's second highest number of HIV infected people. HIV infection is increasingly becoming a prominent cause of childhood morbidity and mortality in India. The suppression of immune system primarily affecting cell mediated immunity is hallmark of AIDS. Early diagnosis is important for timely initiation of ART because it is desirable to start treatment before severe immune deficiency. Aims and objectives: to study role of HAART in improvement of immunological profile of paediatric HIV patients. Material and Methods: The present prospective study was carried out in ART Centre and paediatric ward of Government Medical College, Latur. Children with HIV and fulfilling their criteria of starting HAART were followed for one year. And the effect of HAART on the immunological status was observed. **Results:** Significant improvement in mean CD4 count and CD4% was seen after 6 month and after one year of institution of HAART. Mean CD4 count was increased to 856.4 from 606.8. **Conclusion:** HAART has defiantly important role in improvement of immunological profile of pediatric HIV patients.

Keywords: antiretroviral therapy, HIV.

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INTRODUCTION

India harbors world's second highest number of HIV infected people. HIV infection is increasingly becoming a prominent cause of childhood morbidity and mortality in India. Presently 3.4 million children are living with HIV/AIDS in India at the end of 2011[1]. The global impact of HIV epidemic has been so dramatic and devastating that it has been described as the "epidemic of current century".[2] the **UNAIDS report** on the global AIDS epidemic estimated that approximately 210 000 newly infected children in 2012. This represents a reduction of 130 000 new infections annually, or a 38% drop from 2009, when these countries had 340 000 new HIV infections among children. The suppression of immune system primarily affecting cell mediated immunity is hallmark of AIDS. This affect causes CD4 T cell as well as impairment in the function of surviving helper T cells, because of depletion of CD4 T cell is critical to the pathogenesis of AIDS. CD4 lymphocyte count is currently the most important parameter in management and staging of patient infected with HIV, guiding the decision about retroviral therapy.[3] early diagnosis is important for timely initiation of ART because it is desirable to start treatment before severe immune deficiency. Infants, if severely immune-compromised at start of therapy, experience higher mortality, one of the reasons being development of immune reconstitution inflammatory syndrome (IRIS).[4] Children with CD4 less than 5% at start of treatment were least likely to reach target outcome of CD4 more than 25%. On the other hand, children put early on ART while CD4 was more than 25% experienced 75% reduction in mortality compared with those who received it after CD4 had fallen below 20%.[5] Also Early institution of ART is shown to improve nutritional status of HIV infected children with achieving weight for age and also gaining height velocity after start of therapy. It is also shown to improve CD4

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count as stated earlier. This study focuses on effect of ART on CD4 count improvement in Patients of HIV which are newly started ART.

AIMS AND OBJECTIVE

To study role of HAART in improvement of immunological profile of paediatric HIV patients.

MATERIAL AND METHODS

Study design:

The present prospective study was carried out in ART Centre and paediatric ward of Government Medical College, Latur. The study was carried during the period of October 2011 to October 2013.

Sample Size:

All children who were HIV reactive attending ART OPD or IPD during the 1st year of study period (i.e. oct2011 to sept2012) were included in the study. Following inclusion and exclusion criterion was used to select the study subjects.

- **Inclusion Criteria:** age more than 1½ year (18 months) to less than 14 years and who are fulfilling criteria for starting HAART.
- **Exclusion Criteria:** Children less than 1 ½ years and those above 14 years and already on ART.

Methodology:

Written and informed consent of all parents / caretakers was taken before performing the tests and examination. All children were confirmed HIV seropositive using Three Rapid Tests (Tridot, Coombed, and Immunochromatography) were included in this study. Children enrolled in the study were subjected to detailed clinical examination and history was taken regarding family status as mentioned in proforma. A detail history, physical examination and investigations were carried out as in all cases and entered on predesigned and pretested proforma. Laboratory evaluation was done in all cases on ART such as hemoglobin, total WBCs count, CD4 cell count and ESR. If required Tuberculin test, LFT, urine examination, chest roentgenogram was also done. Each subject was followed for one year every 6 monthly and with clinical monitoring and anthropometry and laboratory investigation. Full precautions were taken by using AIDS KIT containing disposable gown, face mask, cap, gloves, goggle, etc.

RESULTS

Table 1: Age wise Distribution for diagnosis of HIV

		Total	Percentage
Age	1 ½ – 3 year	05	4.55
	>3 – 5 year	07	6.36
	> 5year	98	89.09
Sex	Male	70	63.63
	Female	40	36.37

Table no.1 showed that age and sex wise distribution for diagnosis of HIV. Maximum number of patients i.e. 89.09% diagnosed of HIV were >5 years of age. 63.63% children were male.

Table 2: Distribution of according to presenting symptoms in patients of HIV

Presenting symptoms	Number	Percentage
Weight loss	62	56.36%
Fever	40	36.36%
Cough	35	31.81%
Diarrhea	25	22.72%
Skin lesions	30	27.27%
Swelling	7	6.36%
Ear discharge	23	20.9%
Oral thrush	6	5.45%

It was observed that weight loss (56.36%) was the most common presenting symptoms in HIV patients in the study followed by fever (36.36%), cough (31.81%). Whereas oral thrush was the least common complaint (5.45%).

Table 3: Age groupwise distribution of children according to level of immunodeficiency as per CD4% at start of HAART

Age group (number)	CD4 percentage = Absolute CD4 count X 100 / Total leucocyte count				Mean CD4 count
	<15%	15-20%	20-25%	>25%	
1½ - 3 (05)	03	02	0	0	1094
3 – 5 (07)	04	02	01	0	824.3.
>5 (98)	60	18	15	05	567.1
Total = 110	**67 (60.90%)**	**22 (20%)**	**16 (14,54%)**	**05(4.54%)**	**606.8**

Immunedeficiency level at the start of ART, it was observed that CD4% was less than 15% in all the age group. 60.90% children were having CD4 percentage less than 15%. Cd4% more than 25% was observed in only 4.54% cases. Mean CD4 count was 606.8 at the start of HAART.

Table 4: Age groupwise distribution of children according to level of immunodeficiency as per CD4% after 6 month of HAART

Age group	CD4 percentage = absolute CD4 count X 100 / Total leucocyte count				Mean CD4 COUNT
	<15%	15-20%	20-25%	>25%	

1-3(05)	00	02	01	02	1405*
3-5(06)	01	02	01	02	1068.8*
>5(89)	31	27	15	16	737.1*
Total =100	**32 (32%)**	**31 (31%)**	**17 (17%)**	**20 (20%)**	**795.8***

*Paired t Test=<0.05 (0.001) highly significant compared to baseline, df=109.

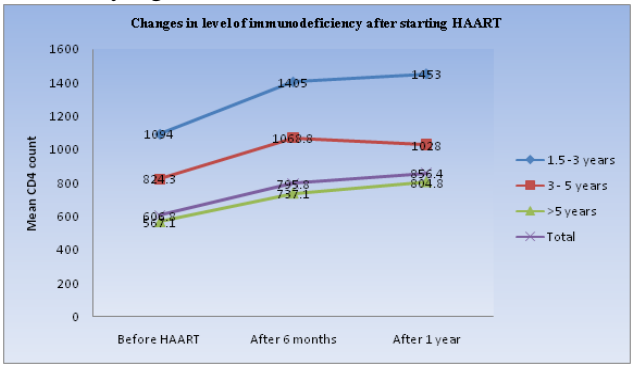
After 6 month of HAART CD4% was calculated in all the study population. But out of 110 children, 10 children were not traceable so they were excluded from study. The CD4% in the remaining children was observed to be increasing. Initially children with CD4% more that 25% were only 4.54% have been increased to 20% after 6months of HAART. The mean cd4 count was 795.8 after 6 month of HAART. When paired t test was applied to the mean CD4 count at the start of treatment and after 6monts of treatment it was observed that the difference was statically significant.

Table 5: Age groupwise distribution of children according to level of immunodeficiency as per CD4% after 1 year of HAART

Age group	CD4 percentage = absolute CD4 count X 100 / Total leucocyte count				Mean CD4 Count
	<15%	15-20%	20-25%	>25%	
11/2 -3(05)	01	01	01	02	1453*
3 – 5 (06)	02	01	01	02	1028*
>5(89)	20	17	33	19	804.8*
Total = 100	**23(23%)**	**19(19%)**	**35(35%)**	**23(23%)**	**856.4***

*Paired T test<0.05 (0.0001) highly significant compared with baseline.

After one years of HAART, it was observed that majority of the children had CD4% more than 20%. Level of immunodeficiency as per CD4% after 1year of HAART which show 20.90% patients were having CD4% < 15%. Mean CD4 count was 856.4 after one year of HAART. And when compared to previous count the difference was statistically significant.



DISCUSSION

The present study was carried out carried out in ART Centre and pediatric ward of Government Medical College, Latur with the objective to study effect of HAART immunological profile. It was observed that majority of the children were more that 5 year old at the time of diagnosis of HIV. The mean age of diagnosis was 6.9 years that was similar to Bolton Moore (2007)[6] and Priyadarshini *et al* (2009)[2] studies having age of diagnosis of 7 years and 6 years respectively. Out of 110 patients 70(63.63%) were males and 40(36.37%) females depicting male predominance. Male predominance was seen in most of the studies as in Lodha *et al*[7] (2006) with 89.3%, Bachou *et al*[8] (2006) with 62% and Agrawal *et al*[1] (2009) with 74.5% males. Causes of male predominance can be because females are less cared for and looked after in our society as compared to male leading to more number of male candidates brought for routine checkup and follow up. In this study patients presented with various symptoms as weight loss 62(56.36%), fever 40(36.36%), cough 35(31.81%), diarrhea 25(22.72%), skin lesions 30(27.27%), swelling 7(6.36%), ear discharge 23(20.9%) and oral thrush in 6 (5.45%) of patients. Weight loss was most common seen in 56.36%. Similar observations seen in Lodha *et al*[7] (2006) and Sharma *et al*[9] (2009) studies where weight loss was most common symptom seen 81.3% and 26% of patients respectively. However in studies done by Swaminathan *et al*[10] (2002), Shah *et al*[11] (2004), Mbewe *et al*[12] (2009) and Agrawal *et al* (2009)[1] most common presenting complaints were cough (97%), skin rash (79%), URTI (58%) and fever (53%) respectively. Clinical course and symptomatic presentation varies from patient to patient and from country to country, the progression and outcome of HIV/AIDS is influenced by factors such as baseline health and nutritional status, environment, endemic diseases and access to therapy. It is important to

understand the presentation of HIV disease in the local context.[13] Receptor for HIV is the CD4 antigen and therefore virus may infect any cell bearing the CD4 antigen on surface.[14] HIV preferentially infects the very cells that respond to it (HIV-specific memory CD4 cells), which accounts for the progressive loss of these cells' response and the subsequent loss of control of HIV replication. When HIV replication reaches a threshold (usually within 3–6 week from the time of infection), a burst of plasma viraemia occurs. This intense viraemia causes Flulike symptoms (fever, rash, lymphadenopathy, and arthralgia) in 50–70% of infected adults.[15] While studying the immune status of study population before starting HAART it was observed that 80.90% of children were severely immunodeficient (i.e. CD4% less than 20%) while the remaining were mildly immunodeficient. Similar observations were seen in Shaila Naykwazi[16] (2009) and MwangelwaMubiana[12] (2009) study where 80.9 % and 81.4% were severely immunodeficient at start of study. However in the study conducted by Seth *et al*[17] (2009) and Lodha *et al*[7] (2006) majority patients were of mild grade of immunodeficiency. And only 22% and 40% respectively were severely immunodeficient at the start of therapy. This difference may be due to early initiation of therapy in above studies depending upon clinical staging of patients. When CD4% and mean CD4 count was measured 6 month after initiation of HAART, it was observed that CD4% and mean CD4 count has increased significantly and the difference was also statically significant. During follow up in current study after one year, patients with CD4% < 15 % reduced to 23%, while CD4% >25% seen in 23% cases. Mean absolute CD4 count after 1 year of ART was 856.4. This was also statistically highly significant ($p<0.0001$). Similar statistically significant improvement in absolute CD4 count was also seen in Lodha *et al*[7] (2006), Devi *et al*[18] (2009) and Moore *et al*[6] study.

CONCLUSION

Thus from the above findings and discussion we conclude that HAART has defiantly important role in improvement of immunological profile of pediatric HIV patients.

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