Research Article

Effect of institution of HAART in correlation with various anthropometric indices in paediatric HIV patients

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Abstract

Introduction: The estimate number of children living with HIV/AIDS in India is 0.17 million. Malnutrition has a major impact on the outcome of HIV disease as it not only increases mortality but also results in an impaired response to antiretroviral therapy. There is a complex three-way relationship between malnutrition, the immune system and infection, with malnutrition eliciting immune system dysfunctions, which in turn promote increased vulnerability of the host to infection, and the latter intensifying the severity of malnutrition. Aims and objectives: to study effect of institution of HAART in correlation with various anthropometric indices in paediatric HIV patients. Material and Methods: In the present prospective study carried out in ART Centre and paediatric ward of Government Medical College, Latur children with HIV and fulfilling the criteria of starting HAART were followed for one year to see the effect of HAART on anthropometric indices. **Results:** underweight was most common type of malnutrition seen in 59.09% followed by stunting in 54.54% and wasting in 32.72% at start. There was statistically significant improvement in nutritional status (underweight, wasting, as well as stunting) after 6 month as well as 1 year after institution of ART. **Conclusion:** children with HIV respond very well to HAART and significant improvement was in anthropometric indices was observed.
Keywords: antiretroviral therapy, HIV.

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INTRODUCTION

The WHO Global Programme on AIDS had developed a Global AIDS Strategy, which was approved by the World Health Assembly. The Global AIDS strategy established the objectives and principles of local, national and international action to prevent and control HIV/AIDS and it included the need for every country to have a "supportive and non-discriminatory social environment".[1, 2, 3] Total HIV infection in India was 3.5 million in year 1998, 3.71 million in 1999, 3.86 million in 2000, 3.97 million in 2001, 4.58 million in 2002, 5.1 million in 2003 and 5.134 million in 2004 and 23.9 lakh in 2009. The estimate number of children living with HIV/AIDS in India is 0.17 million[4]. Malnutrition has a major impact on the outcome of HIV disease as it not only increases mortality but also results in an impaired response to antiretroviral therapy.[5] The varied clinical presentation of HIV uninfected children with malnutrition is determined by the complex interactions between specific nutrient deficiencies, infections, and stress within each individual. Decrease in food intake leads to wasting, with associated reduced function of body organs and systems, and an increased susceptibility to environmental perturbations or stress.[6] HIV infection affects nutrition through increases in resting energy expenditure, reductions in food intake, nutrient mal-absorption and complex metabolic alterations that culminate in weight

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loss and wasting common in AIDS. The effect of HIV on nutrition begins early in the course of the disease, even before an individual may be aware that he or she is infected with the virus. Asymptomatic HIV positive individuals require 10% more energy and symptomatic HIV-positive individuals require 20%- 30% more energy than HIV-negative individuals of the same age, sex and physical activity level.[7] There is a complex three-way relationship between malnutrition, the immune system and infection, with malnutrition eliciting immune system dysfunctions, which in turn promote increased vulnerability of the host to infection, and the latter intensifying the severity of malnutrition. The immune dysfunctions associated with malnutrition are referred to as Nutritional Acquired Immunodeficiency Syndrome (NAIDS).[8] Thus the present study was undertaken to study the effect of HAART on anthropometric indices i.e. nutritional status of children with HIV. Aims and objectives: to study Effect of institution of HAART in correlation with various anthropometric indices in pediatric 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. And in the second year they were followed up for changes in anthropometric indices. 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. Anthropometric assessment with regards to weight, Length/ Height was done in all cases. Nutritional assessment was done as per WHO classification and categorize as normal, stunting, wasting and Underweight. Weight was measured by using electronic weighing machine, length by infantometer, height by wall mounted stadiometer and values were plotted on WHO Chart according to age, sex and categorized. Prevalence of underweight, wasting and stunting was calculated for the different age group and both sexes using WHO Anthro, WHO Anthroplus and Epi (info) nutritional software version 3.4.3 and severity was classified based on Z score. 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 and sex wise Distribution of Children with 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 in the present study.

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

Symptoms / signs		Number	Percentage
Presenting symptoms	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%
	Lymphadenopathy	58	52.72%
	Hepatomegaly	54	49.09%
Presenting Signs	Fever	34	30.9%
	Pallor	29	26.36%
	Skin rash	24	21.81%
	Hair changes	10	9.09%
	Edema	9	8.18%
	Oral thrush	8	7.27%
	Splenomegaly	12	10.90%
	Hepatosplenomegaly	15	13.63%
	Clubbing	2	1.81%
	Icterus	4	3.63%
	Parotitis	2	1.81%

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%). On clinical examination it was observed that lymphadenopathy (52.72%) was the most common sign observed followed by hepatomegaly 49.09%.

Table 3: Effect of HAART on nutritional status

Anthropometric Indices	At start of study	After 6months of therapy	After 1 year of therapy
Underweight	30	39	14
Mod	35	10	10
Severe	Total=65 (59.09%)	Total=49* (49%)	Total=24* (24%)
Wasting	14	14	9
Mod	22	4	4
Severe	Total=36 (32.72%)	Total=18* (18%)	Total=13* (13%)
Stunting	30	20	32
Mod	30	20	7
Severe	Total=60 (54.54%)	Total=40* (40%)	Total=39* (7%)
Oedema	9 (8.18%)	6 (6%)	4 (4%)
Normal nutritional status	8 (7.27%)	18* (18%)	30* (30%)

*Paired t Test < 0.05 (0.001), highly significant, df =109

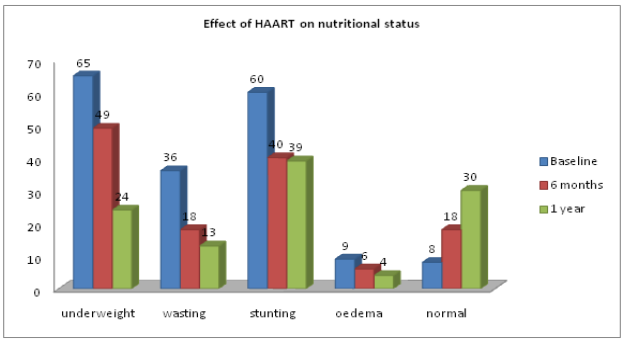


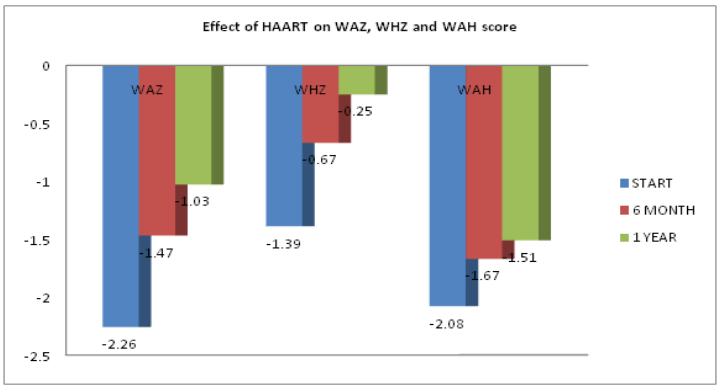
Table no. 3 showed the prevalence of malnutrition among HIV infected children. It was observed that prevalence of underweight was 59.09% and that of stunting 54.54%.While7.27% of patients were having normal nutritional status at the start of study. After 6 months of HAART improvement in the nutritional status was observed. It was seen that prevalence of underweight was reduced to 49% from 59.09%. At the start of study wasting was observed in 32.72% children who were decreased to 18% after 6 month of HAART. The difference observed in the anthropometric indices after 6 month of HAART was statically significant. After one year of therapy there was statistically significant improvement in nutritional status of patients with reduction in number patients being underweight, wasted and stunted. The percentage of normal nutritional children was also increased from 7.27% to 30% after the one years of treatment.

Table 4: Effect of HAART on WAZ, WHZ and WAH score in children with HIV at baseline and follow up.

Anthropometric Indices	At the start of therapy	After 6 months of therapy	After 1 year of therapy
WAZ score	-2.2609	-1.4739*	-1.0309*
WHZ score	-1.3904	-0.6703*	-0.2577*
WAH score	-2.0826	-1.6723*	-1.5198*

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

Table no. 4 showed effect of HAART on various anthropometrical parameters with all three parameters as WAZ (Weight for Age), WHZ (Weight for Height) and WAH (Height for Age) were -2.26, -1.39 and -2.08 at start of therapy. There is statistically significant improvement in above three parameters after ART.



DISCUSSION

The present prospective study was carried out in ART Centre and pediatric ward of Government Medical College, Latur with the objective to study effect of HAART on various anthropological indices. 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)[9] and Priyadarshini *et al* (2009)[6] 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*[10] (2006) with 89.3%, Bachou *et al*[11] (2006) with 62% and Agrawal *et al*[12] (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*[10] (2006) and Sharma *et al*[13] (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*[14] (2002), Shah *et al*[15] (2004), Mbewe *et al*[16] (2009) and Agrawal *et al* (2009)[12] 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.[17] Patients had various signs as such as fever in 30.9%, lymphadenopathy in 52.72%, pallor in 26.36%, skin rash in 21.81%, hair changes in 9.09%, edema in 8.18%, hepatomegaly in 49.09%, oral thrush in 7.27%, splenomegaly in 10.90%, hepatosplenomegaly in 13.63%, clubbing in 1.81%, icterus in 3.63% and parotitis in 1.81%. Lymphadenopathy was the most commonly observed physical finding seen in 52.72% patients. Similar observations were seen in studies as Hamid *et al* (2008) and Agrawal *et al* (2008).[1, 18] Generalized lymphadenopathy and Hepatosplenomegaly are common clinical presentations. These features are a part of diffuse infiltrative lymphocytosis syndrome (DILS) associated with a milder form of disease and possibly associated with a good prognosis in children[19.] Notional assessment was done in the present study by using various anthropometric indices. In present study at the start of ART prevalence rates were as follows with underweight in 59.09%, wasting in 32.72%, stunting in 54.54%, edema in 8.18% and normal nutritional status in 7.27% patients. Similar observations were reported by Padmapriyadarshini *et al* (2007), Naykwazi *et al* (2009) and Devi *et al* (2009).[6,20,21] Wasting was also common seen in 32.72% and these findings correlates with the study conducted by Devi *et al*.[21] It was seen that after 6 months prevalence of underweight was reduced to 49% from 59.09%. At the start of study wasting was observed in 32.72% children who were decreased to 18% after 6 month of HAART. The difference observed in the anthropometric indices after 6 month of HAART was statically significant. Similarly after one year of therapy there was statistically significant improvement in nutritional status of patients with reduction in number patients being underweight, wasted and stunted. The percentage of normal nutritional children was also increased from 7.27% to 30% after the one years of treatment. WHO has classified Malnutrition on the basis of weight for height, height for age and presence of oedema. WHO recommends use of z scores or standard deviation scores (SDS) for evaluating anthropometrical data, so as to classify individuals with indices below the extreme percentiles. The calculation of SDS gives a numerical score indicating how far away from the 50th centile for age the child's measurement falls. A score of -2 to -3 indicates moderate malnutrition and a score less than – 3SDS indicates severe malnutrition. In the present study Z score was calculated for Weight for Age, Weight for Height and Height for Age at the beginning of the study then after 6 months and 1 year of HAART. It was observed that mean WAZ was -2.26, mean WHZ was -1.39 and mean WHZ score was -2.08 at start of therapy. Mean WAZ score in present study was – 2.26 at the start of study similar to Lodha *et al* (2006), Devi *et al* (2009) and Moore *et al*(2010) studies where it was -2.50, -2.86 and -2.2 respectively.[9,10,21] Similarly WHZ and WAH at baseline were -1.3904 and -2.0826 in current study similar to study done by Lodha *et al* in which these were -2.41 and -2.02 respectively. Statistically significant reduction in mean WAZ, WHZ and WAH score after 1 year of ART which were -1.03, -0.25 and -1.51 respectively. Similar statistically significant improvement in all above parameters was seen in Lodha *et al* (2006), Devi *et al* (2009) and moore *et al* (2010) studies. [10, 21, 22] Malnutrition alters all defense mechanisms including anatomic barriers, cell-mediated immune (CMI) responses, phagocytic cell/microbicidal functions, and humoral (antibody and complement responses) among many others. Some of the immunological changes observed in malnourished individuals bear a striking resemblance to those encountered in HIV infection.[8] There is a complex three-way relationship between malnutrition, the immune system and infection, with malnutrition eliciting immune system dysfunctions, which in turn promote increased vulnerability of the host to infection, and the latter intensifying the severity of malnutrition. The immune dysfunctions associated with malnutrition are referred to as Nutritional Acquired Immunodeficiency Syndrome (NAIDS).[8] Thus from the above discussion we can observe that significant improvement in nutritional status was observed after institution of HAART.

CONCLUSION

Children with HIV respond very well to HAART and significant improvement was in anthropometric indices was observed.

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