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Original Article

Effects of Anti-Retroviral Therapy with duration on physical growth and CD4 count among age group 5 to 16 years in HIV patients at Karunalayam- Telangana State- cohort study

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ABSTRACT

In the last 30 years, HIV and acquired immunodeficiency syndrome (AIDS), has proving "inherently untreatable" disease in spite of eminently approved ART. **Aims & Objectives:** 1. To study ART effects on physical growth and CD4 count in HIV children. 2. To study whether good Nutrition, better care and support can extend the life span. 3. To assess the effects of ART on attaining maturity. **Materials and Methods:** It is a cohort study on 87 HIV/AIDS orphan children. Only 67 male & female children - 5 to 16 years age on ART, who were residing at care and support centre karunalayam- Warangal district. Once in 3 months recorded height, weight and CD4 cell count once in 6 months and assessment of maturity once in a year. **Study duration**: 1st January 2010 to 31st December 2016. **Results:** From 87 children study group, 67 children on ART. The study reveals 35.8% males and 46.2% female children's height is stunted. 10.4% male and 8.9% of female children were wasted. Signs of maturity were delayed in both sex groups. With ART regime 64.1% improvement in CD4 cell Count. Deaths 8.0%. CFR 5.3%. **Conclusion:** Better nutrition and early ART can extend the life span in CD4 count > 200 cell/mm^3.

Keywords: Human immunodeficiency virus (HIV) / Acquired immunodeficiency syndrome (AIDS), CD4 cells.

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INTRODUCTION

In the last 30 years, HIV /AIDS proving that it is an "inherently untreatable" disease. In young children HIV infection most commonly arises as a result of mother-to-child transmission (MTCT). It is thought that only 1.5 -2% of MTCT occurs transplacentally during pregnancy. In booked antenatal cases, a negative HIV test does not preclude neonatal infection - maternal infection and Sero-conversion can occur at any time during pregnancy and lactation. This is well documented in countries with a high prevalence of HIV and has been seen in the UK.[1] Morris et al.[16] reported that intrauterine exposure to ARTs either as a maternal therapy or as chemoprophylaxis to prevent mother-to-child HIV transmission did not appear to significantly affect birth outcomes.

In 2014, approximately 17.8 million children had been orphaned by HIV.[2] The studies shown that children orphaned by AIDS are those under the age of 18 who have lost one or both parents to the disease. According to UNAIDS, nearly 15million orphan children are there worldwide.(9) It is estimated that India has the largest number of AIDS orphans of any country and this number is expected to double in the next 5 years.[8] World Bank estimates suggest that the number of children in India orphaned by AIDS was 2 million in 2005, which is expected to double by 2010 and remain exceptionally high until 2020 or 2030.[10,11] The interaction of HIV/AIDS with nutritional status has been a distinguishing characteristic of the disease course since the earliest days of the epidemic. The term "slim disease" was often used in endemic areas such as sub-Saharan Africa to reflect the wasting syndrome characteristically associated with HIV/AIDS and related diseases. [3–5]

HIV protease inhibitor (PI) confer virological, immunological, clinical and survival benefits.[4,5] ART has brought about a substantial decrease in the death rate due to HIV-1 infection, changing it from a rapidly lethal disease into a chronic manageable condition, compatible with very long survival. Protease inhibitors in combination with HIV reverse transcriptase inhibitors are now recommended as standard antiretroviral therapy.[6,7] Our study subjects are both male and females, age group is 5years to 16 years. We have made two study groups, i.e. 5 years to 9 years and 10 years 16 years to assess the physical growth (height & weight) and CD4 count. The study focused on development in adolescent and signs of maturity from 10 to 16 years (middle group) after ART Regimen. In terms of psychological, physiological and social development, adolescence is subdivided into early, middle and late adolescence.[12] In the early stage (10–13 years), are heralded by rapid physical changes with the onset of puberty (8–11 years in females and 9–11.5 years in males). The middle stage (14–16 years) is characterized by an increased scope of feelings, and increased importance of peer group values and more risk-taking behaviours. The late stage (17–19 years) represents emerging adults who have successfully transitioned into accepting responsibility for their behaviours.[13]

Aims & Objectives: 1. To study ART effects on physical growth and CD4 count in HIV children. 2. To study whether good Nutrition, better care and support can extend the life span. 3. To assess the effects of ART on attaining maturity.

MATERIALS AND METHODS

The study conducted on 87 orphan children, among them 67 children (male & females) on ART and other 20 children not on ART. I am the consulting paediatrician since 2006 onwards. All are HIV/AIDS orphan children, residing in care and support centre at karunalayam, Warangal District. Once in 3 months recorded height and weight (physical growth), once in 6 months tested for CD4 cell count and assessment of maturity once in a year for 10-16 years age group, who residing at care and support centre under the guidance of Fr. Jyotish director of that centre.

Study duration: 6 years (1st January 2010 to 31st December 2016).
Exclusive criteria: HIV diagnosed and not residing at Karunalayam was excluded.
Inclusive criteria: HIV & AIDS children residing at karunalayam were included.
Study Limitation: No attendants or guardians was interrogated personally (non- availability). All are orphan children.

Table: 1. ART with Age and Sex wise distribution among HIV/AIDS children.

Age groups	Sex				Total (%)
	Female	%	Male	%	
5-9	5	7.46	6	8.96	11(16.41)
10-16	36	53.73	20	29.85	56(83.59)
Total	41	61.19	26	38.81	67(100)

Among the study group 83.59% are 10- 16 years and 16.41% are 5-9 years of both sex groups. Females are more (61.19%) & males less (38.81%) in number with ART.

Table 2: Effects of ART with duration in years on height & weight (physical growth) of study groups (water low's classification).

Sex	Duration of Art in years	% of Height for age			% of Weight for height			Total
		<80	81-95	>95	<70	71-90	>90	
Male	1 – 5	2	12	1	0	4	11	15
	6 – 10	0	10	1	0	3	8	11
Female	1 – 5	1	17	6	0	5	19	24
	6 – 10	0	13	4	0	1	16	17
Total and (%)		3 (4.4)	52 (77.6)	12 (17.9)	0	13 (19.4)	54 (80.5)	67 (100)

With ART regime 82% of the children having stunted growth for Height/ Age.
With ART regime 80.5% of the study group were normal (>90%) weight/ height.
Children with ART 1 to 5years duration among males 80% height and among females 70.8% height between 81 – 95% for the age.
Children with ART 6 to 10 years duration among females 76.4% height and in males 90.9% height. It is less than average height (<95) for the age.

Table 3: t. test comparison for height/age among study group.

Height/age	Mean	Std. Deviation
Admission height/age	132.92	11.392
Present height/age	147.94	7.642

Above Table indicates at the time of admission (before ART) Height/Age and present Height/Age after ART shows p=0.000 value significant.

Table 4: Comparison between mean weight/height at the time of admission and present date.

Height/ Weight	Mean	Std. Deviation
Admission weight	29.31	8.921
Present weight	39.08	6.618

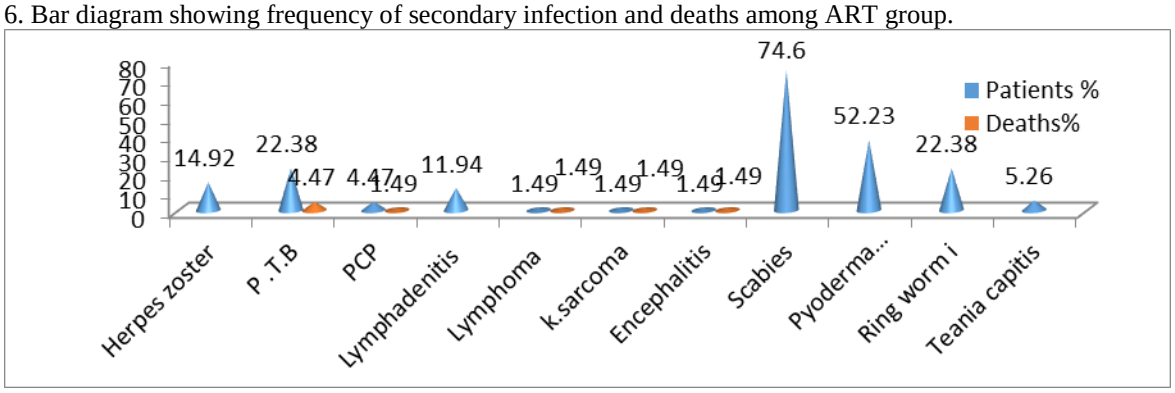
The present study shows there is marked difference in weight after ART Treatment. p=0.000 s (Statistically significant).

Table 5: Effects of ART with duration in years and improvement of CD4 cell count.

Sex	Duration of ART in years	CD4 Count		
		<200	>200	Total
Male	01-Apr	4	8	12
	05-Aug	3	11	14
	09-Oct	0	0	0
Female	01-Apr	9	7	16
	05-Aug	2	21	23
	09-Oct	0	2	2
Total (%)		18(26.8%)	49(75%)	67(100%)

The table 5 shows in study group 75% improvement in >200 CD4 cell Count after ART in both the groups.

6. Bar diagram showing frequency of secondary infection and deaths among ART group.



74.60% of ART group suffering with systemic scabies, 52.23% of study group suffering from secondary infection (pyoderma), 22.38% P.T.B & Tinea and 11.9% Lymphoma.
8.0% Deaths occurred due to Pulmonary T.B & Lymphoma and Viral Encephalitis.

RESULTS AND DISCUSSION

87 study group children are suffering with HIV/AIDS residing at karunalayam care & support centre and all are orphan children in Warangal district. Among them 67 children on ART and other 20 children not on ART. All those are either they lost one parent or both the parents by HIV/AIDS. Similar survey done by foundation for AIDS Research-2004 Children whose parents have AIDS and/or die with AIDS, are thus impacted medically, socially, and economically.[17]

Table 1 shows age of the study group 5years to 16 years (both males and females). We made two groups i.e. 5 to 9 years (1st group) and 10 to 16 years (2nd group) to assess the physical growth (height & weight). The study focused on adolescent age 10 to 16 years (middle group) of their physical development before and after ART regime.

In present study, in age group 10 to 16 years both the male & females are 83.59% and among them 61.19% are female children. In this, 53.73% females belongs to 10- 16 years and all are orphans. In 2014, approximately 17.8 million children had been orphaned by HIV.[2] The similar study shows that children orphaned by AIDS, those were under the age of 18 years who have lost one or both parents to the disease.[9]

Table 2 shows that after introducing ART regime 82% of the children having stunted growth in Height/Age. In our study, children with ART 6 to 10 years duration shows that females 76.4% height and males 90.9% height less than average height (<95% water low's classification) stunted for the age.

The similar study by Nachman et al.[18] with ART regime Protease Inhibitors (PI_s), performed a secondary analysis on data from a cohort of 197 children who had been randomly assigned to receive combination therapies of either Ritonavir plus Stavudine or Rritonavir plus Azidothymidine and Lamivudine. In this case a significant decline in height and weight associated with the PI_s.[18]

In another study by Steiner et al.[19] also revealed the exemplified results reported by the effect of PIs (Ritonavir or Nelfinavir) on growth of HIV-infected children aged 0–17 years.

Similar study done in U.S.A by Buchacz et al.[20] conducted a prospective cohort study in the United States of 906 HIV infected children (aged 3 months to 18 years) before and after receiving Protease Inhibitors containing regimens. There was a more significant deficit in age adjusted height than weight in the HIV infected children at baseline.

Our study further shows that nutritious diet, better care and ART regime have 80.5% normal weight/height (>90% water low's classification). Similar study by Miller et al. were able to account for this through measurement of dietary intake.[22]

Table 3&4 indicates at the time of admission height/age and present height/age shows statistically significant. t=5.599 p=0.000. The present study shows there is marked stunting in height and normal weight/height after ART treatment.

Similar study shows by Verweel G. *et al.*, that treatment with ARV regimens containing PIs significantly affected weight and weight for height ratio and had a marginal effect on height.[21]

The table 5 shows among study group 75% improvement of the CD4 cell count in both the groups. 59% of the adolescents had a CD4 cell count greater than 200 cells/mm^3 at the start of treatment. Similar study for best growth outcomes into adolescence, Dr Lazarus and her colleagues recommended starting antiretroviral treatment in

children over five years of age with CD4 cell counts over 200 cells/mm^3.[3]

The bar diagram of study group depicts HIV/complications like systemic scabies 74.6%, secondary infection 52.2%, pulmonary tuberculosis 22.3% and 11.9% lymphomas. Deaths 8.0% and Case Fatality Rate 5.3%. More than 6 years, in our observation majority children with ART regime the signs of maturity were delayed. The secondary sexual characters were also delayed in spite of improved CD4 count.

CONCLUSION

In study group of 87 children, 67 children on ART. After introducing ART regime 82% of the children having stunted growth in Height/ Age, in which females were 76.4% and males were 90.9% height less than average height/age (<95% water low's classification). On observation of 6 to 10 years it shows statistically significant. t=5.599 p=0.000 s

Previous guidelines of NACO for ART regime was CD4 cell count <200 mm^3which has given early complications & early deaths. Now NACO changed the guidelines to >200 cells and <300 cell mm^3 can start ART.

In our study, among the study subject 75% shows improvement in CD4 cell count in both the groups. After more than 6 year observation, majority children with ART regime have delayed signs of maturity in both sex groups. 8.0% of deaths were due to complications of AIDS. Case fatality rate (CFR) 5.3%. Good nutrition and early ART regime can extend the life span.

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Conflict of interest: There are no conflicts of interests.

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