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Original Article

Anemia in The Shadows: A Cross-Sectional Study of Nutritional Challenges Among HIV Positive Children in Central Maharashtra

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ABSTRACT

Background: Acquired immunodeficiency syndrome (AIDS) has turn up as one of the most serious public health problems in India. Human Immunodeficiency Virus (HIV) infection is of great concern in the pediatric population. Nutrition has crucial role in physical growth and development, brain function and maintenance of complete health of child. It important to balance relationship between HIV infection, nutrition, growth and survival of children living with HIV so, this study aims to study the nutritional profile of children affected with HIV.
Methods: Our study cross-sectional study conducted over a period of one year. A total of 235 HIV infected children aged ≤15 years and on antiretroviral therapy were included in the study. All study participants were interviewed with the help of parents or guardian and data regarding a clinical profile and socio-demographic variables and nutritional assessment was obtained using a pre tested, structured questionnaire.
Result: we found majority of subjects were anemic and severity of anemia found in more in female. Around 139 study subjects were in WHO clinical stage I and 130 study subjects had CD4 count >500 cell/ µl. Majority of study subjects were asymptomatic at the time of interview. Out of 235 study subjects,35 were underweight,57 were Stunted and 42 with low BMI. Around 143 study subjects had Calorie deficit diet and 174 had protein deficit diet.
Conclusion: The present study emphasizes that anemia and nutritional deficiencies remain common among HIV infected children. Female children exhibiting higher severity of anemia as compare to male children. Strengthening HIV nutritional programme can significantly improve the overall health, growth and improvement in life quality.

Keywords: *HIV, Nutrition, anemia.*

INTRODUCTION

The nutritional consequences of HIV were among the first to be recognized and reported (Slims disease) in Africa. The association between HIV infection and growth faltering in children has been reported in both resource-rich and resource-poor settings. Reduced food intake due to socioeconomic circumstances or opportunistic infections that can affect food intake, absorption and metabolism and so cause weight loss. HIV-infected children who are significantly underweight are much more likely to die than HIV-infected children who are not malnourished(1). HIV and opportunistic infections not only depress the immune system, but also increase the need for energy, protein and other nutritional components. Malnutrition may result, and contribute to further weakening of the immune system(2). Nutritional care of children living with HIV is a fundamental part of the continuum of care and support under the national programme. More than 50% of the children under the age of 5 in our country have malnutrition (2). India still has a significant HIV burden with an estimated 25.44 lakhs PLHIV in 2023. Women (aged 15+ years) accounted for 44% (11.22 lakh) of the total PLHIV burden, while nearly 3% (0.63 lakh) of the cases were among children. (3) It is recommended that nutritional assessment and support

should be an integral part of the care plan of an HIV-infected infant or child.(1) Our research aims to study the nutritional profile of children affected with HIV.

MATERIAL AND METHODS

This cross sectional study was conducted over a period of one year among children with HIV and registered at ART center of study institute in central Maharashtra. A total of 235 HIV positive children aged 15 year and below were participated in study. Children who were on ART treatment at least for last six months were considered as eligible. Informed consent was taken from parents / guardians and assents were taken from participants. Those who were not willing to participate were excluded from the study. Before commencing the study Ethics approval was obtained from the institutional ethics committee. This study is the part of major study. Confidentiality of the study subjects was assured and maintained throughout the study. Data collection was done using a pre-designed and pre-tested questioner which included questions on socio-demographic & clinical profile, latest hemoglobin concentration and CD4 count, Data regarding dietary intake was collected by 24 hours recall method for protein and calories intake and anthropometric parameter.

Sample size: Sample size was calculated based on the prevalence of anemia (81.2%) in the pilot study with absolute precision of 5% and 95% confidence level come out to be 234.47 i.s 235.

Statistical analysis: The data was collected, entered and analyzed using EPI Info 7.1 and SPSS (20). The qualitative data was expressed by percentages and quantitative data was expressed in terms of mean and standard deviations. Chi square test/ Fisher's exact test was applied to observe the differences between proportions. P value <0.05 was considered significant.

RESULT

Out of total 235 study participants, majority 133 (56.59%) were Males.167 (71.10) study participants were between10 to15 years and Mean Age was 10.83±2.4 years.

Majority, 139(59.15%) of study subjects were in to WHO clinical stage 1 followed by 84(35.74%) in stage 2, 12(5.11 %) in stage 3 (Fig 1). As per CDC disease staging, majority 130(55.32%) of them had CD4 count >500 cell/ µl. Study subjects suffered from different morbidities like Pulmonary tuberculosis, Herpes zoster eruptions, Fungal nail infections and Recurrent respiratory infections (ARI) but at time of interview majority of them were asymptomatic.

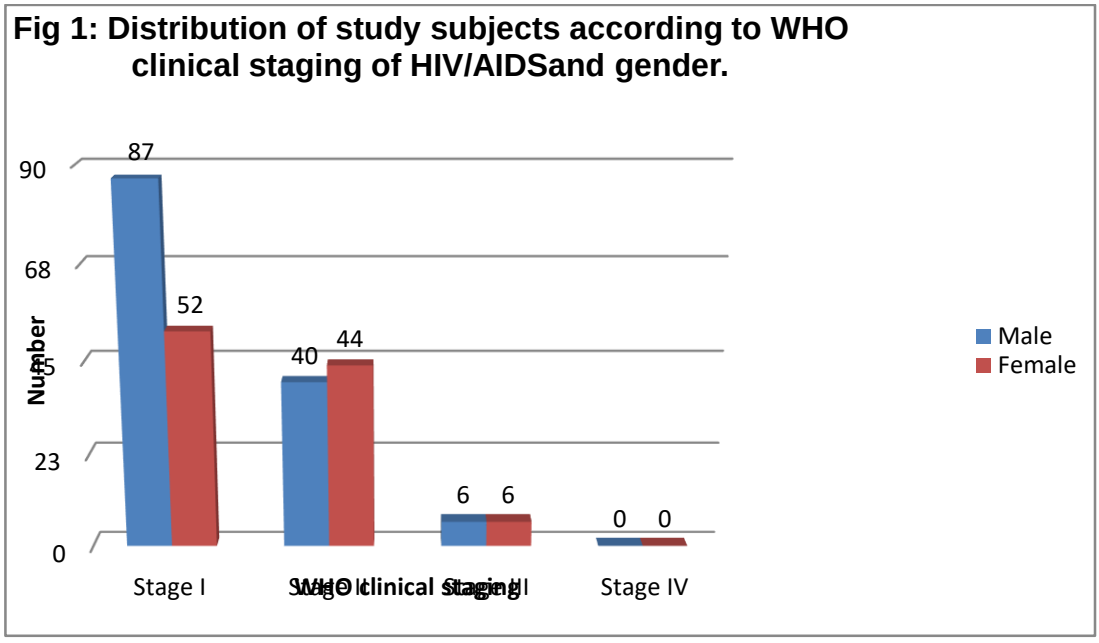

Table 1 - Distribution of study subjects according to the grading of anemia

Grading of anemia*	Number	Percentage
Normal	68	28.93
Mild	42	17.87
Moderate	90	38.30
Severe	35	14.90
Total	235	100.0

Table 1 shows distribution of study subjects according to the grading of anemia. As per WHO grading of Anemia(4) 167 study subjects were anemic and 68 were normal. Out of 167, Moderate anemia seen in 90 study subjects followed by Mild anemia in 42and severe anemia in 35 study subjects.

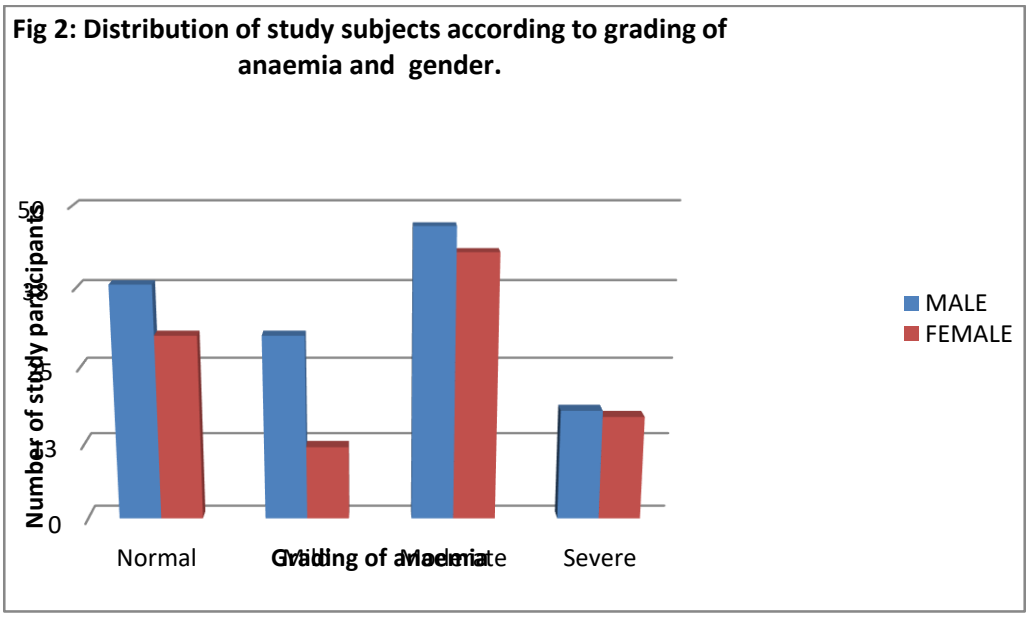

Figure 2 shows distribution of study subjects according to grading of anemia and Gender. Moderate anaemia were more in both males and females, 47(52.2%) and 43(47.8%) respectively. Mild anaemia was more in males 30(71.4%) and severe anaemia was more in males 18 (51.4%).

Table 2- Distribution of study subjects according to Anthropometric parameters

Anthropometric parameters *		**Number**	**Percentage**
Weight-for-age (Underweight)	<-2 SD (Moderate)	30	12.76
	<-3SD (Severe)	5	2.13
Height-for-age (Stunting)	<-2 SD (Moderate)	48	20.42
	<-3SD (Severe)	9	3.82
BMI	<-2 SD (Moderate)	41	17.44
	<-3SD (Severe)	1	0.42

Table 2 shows distribution of study subjects according to Anthropometric parameters. Out of 235 study subjects,35 were underweight,57 were Stunted and 42 with low BMI. In 35 underweight study subjects,30 were moderately underweight and 5 were severely underweight. Mean weight of study subjects was 25.72 Kg ±7.17 SD; with minimum weight of 10 kg and maximum weight of 49kg .Out of 57 stunted study subjects,48 were moderately stunted and 9 were severely stunted with mean height of 129.22cm ±13.00; minimum height of 100cm and maximum height of 160cm .In 42 study subjects, 41 had moderately low BMI and one had severely low BMI with mean BMI 15.32±3.65 Kg/m²; minimum BMI 8 Kg/m² and maximum BMI 29 Kg/m².

Table 3-Distribution of study subjects according nutrition intake.

Age group (years)	**Calorie intake (kcal)*** **(n=235)**					**Protein intake (gm.)*** **(n=235)**				
	Required Kcal/day	**Normal**		**Deficit**		**Required gm/day**	**Normal**		**Deficit**	
		No.	**%**	**No.**	**%**		**No.**	**%**	**No.**	**%**
5 to 6	1350	6	6.52	2	1.40	20.1	4	6.56	4	2.30
7 to 9	1690	31	33.70	29	20.28	29.5	28	45.90	32	18.39

10 to 12	males 2190 Females 2010	29	31.52	74	51.75	males 39.9 Females 40.4	16	26.23	87	50.00
13 to 15	males 2750 Females 2330	26	28.26	38	26.57	males 54.3 Females 51.9	13	21.31	51	29.31
Total		92	39.15	143	60.85		61	25.96	174	74.04

*Revised RDA for Indians 2010(5) *(In addition to age specific needs, HIV positive children will require additional energy, based on actual weight. Here, deficits of calories is calculated after addition of extra required calories in age specific needs of calories* (2)*)*

Table 3 shows distribution of study subjects according nutrition intake. Out of 235 study subjects 143 had Calorie deficite diet and 174 had Protein deficite diet. 29 study subject 7 to 9 years of age, 74 study subjects from 10 to 12 years of age 38 study subjects in 13 to 15 years of age group had Calorie deficite diet. Mean calorie intake 1813.91 kcal ±400.869. Four study subjects In age group of 5 to 6 years, 32 study subject in 7 to 9 years of age, 87 study subjects from 10 to 12 years of age and 51 in 13 to 15 years of age group had Protein deficite diet. Mean protine intake 25.62 gm±7.96.

Table 4 - Distribution of study subjects according to Anemia and WHO HIV Staging.

WHO clinical Staging	**Anemia**						**x^2**	**P value**
	Mild		**Moderate**		**Severe**			
	number	%	number	%	number	%		
Stage 1 (n=139)	33	23.7	39	28.1	17	12.2	14.4	0.00014*
Stage 2 (n=84)	9	10.7	41	48.8	16	19.0	7.68	0.005*
Stage 3 (n=84)	0	0	10	83.3	2	16.7		0.05#
Total	42	17.9	90	38.3	35	14.9		

* Chi square test , # fisher's exact test

Table 4 shows distribution of study subjects according to Anemia and WHO HIV Staging. In WHO clinical stage 1, study subjects with moderate anemia were more when compared with others (mild + severe anemia) and this was found to be statistically significant (X2 value=14.4 p value=0.00014 df=1).In WHO clinical stage 2, study subjects moderate anemia were more when compared with others (mild + severe anemia) and this was found to be statistically significant (X2 value=7.68 p value=0.005 df=1). In WHO clinical stage 3,study subjects subjects with moderate anemia were more when compared with others (mild + severe anemia) and this was found to be statistically significant (fisher's exact test; p value =0.05).

Table 5: Distribution of study subjects according to anaemia and anthropometric parameters

Anthropometric parameters		**n**	**Anaemia**						**c^2**	**P value**
			Mild		**Moderate**		**Severe**			
			No.	**%**	**No.**	**%**	**No**	**%**		
Weight-for-age (Z score)	<-2 SD	30	4	13.33	19	63.33	7	23.33		0.99#
	<-3SD	5	0	0	4	80.00	1	20.00		
Height-for-age (Z score)	<-2 SD	48	9	18.75	25	52.08	14	29.17	1.398	0.23*
	<-3SD	9	0	0	6	66.67	3	33.33		
BMI (Z score)	<-2 SD	41	3	7.31	28	68.29	10	24.40		0.76#
	<-3SD	1	0	0	1	100	0	0		

Table 5 shows, distribution of study subjects according to anaemia and anthropometric parameters. Moderate anaemia were seen in 19 (63.33%) and 4 (80%) of study subjects with Weight-for-age <–2 SD and <–3 SD respectively. 25 (52.08%) and 6(66.67%) of study subjects had moderate anaemia with Height-for-age <–2 SD and <–3 SD respectively. Moderate anaemia were seen in 28(68.29%) with BMI <–2 SD and all of study subjects with <–3 SD BMI. When different stages of anaemia were compared with anthropometric parameters (like Weight-for-age, Height-for-age and BMI), no statistical association was found.

DISCUSSION

In the present study, according to WHO classification system for clinical staging of HIV disease, a majority, 139(59.15%) of study subjects were in stage I followed by 84(35.74%) in stage II, only 12(5.11 %) in stage III which is similar Prakash Poudel et al(6). Finding from Mahesh V et al (7) study for CD4 count is coincide with our study findings i.e. majority 130(55.32%) of study subjects had CD4 count ≥500 cell/ µl (≥26%) and CD4 count between 200-499 cell/ µl (14 -25%) in 103(43.83%) study subjects. Swetha et al(8), Kumar SKK et al (9) and Jadhav VM et al (10) observed that pulmonary tuberculosis were the commonest opportunistic infection seen in study subjects and which was similar to our study. We found 167(71.07%) study subjects were anaemic and moderate anaemia was seen in 90(38.30%) of study subjects followed by mild anaemia in 42(17.87%) and severe anaemia in 35(14.90%) of study subjects. It might be due to poor nutrition. A studies conducted by Shet et al (11), Pol R R et al (12) and Thakor et al (13) concordance with our study. Mohd. Nasir MT et al (14) observed approximately similar anthropometric finding to our study, majority (79.7%) were found to have normal weight-for-age while 17.0% of the children were found to be wasted (WAZ < -2 S.D.). For long-term growth (height for age), it was found that 21.1% of the children were stunted (-3 S.D. < HAZ < -2 S.D.) and 14.7% were severely stunted (HAZ < -3 S.D.). Swetha et al (8) reported, the mean energy intakes were less than the recommended dietary allowances (RDA) in children more than 9 years but were normal in the other age groups. We also observed that around 50% of children had both calories and protein deficit in 7 to 9 years of age group and this deficit increases with age, as the requirement increases. Similarly, Mohd. Nasir MT et al (14) found that as the children became older, bigger differences between their intake and their recommended requirements were observed. Shet et al (11) observed, the prevalence of anaemia in clinical stage I, II, III and IV was 51%, 58%, 87% and 72% respectively which was lower than our study finding. In contrast to our study finding, Shet et al (11) observed that anaemia was significantly associated with poor growth (WAZ, HAZ < -2) and advanced HIV disease status (p <0.005). Pufall EL et al (15) found, the prevalence of anaemia among the underweight was 84.8% which was lower than our finding.

CONCLUSION

The present study emphasizes that anemia and nutritional deficiencies remain common among HIV infected children. Female children exhibiting higher severity of anemia as compare to male children. Strengthening HIV nutritional programme can significantly improve the overall health, growth and improvement in life quality.

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