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Original Research Article

Assessment of nutritional status and the variables affecting the nutritional status of human immunodeficiency virus positive children in antiretroviral therapy centre of J. A. group of hospitals, Gajra Raja medical college, Gwalior, Madhya Pradesh, India

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ABSTRACT

Background: HIV-infected children are undernourished; an improvement in their nutritional status may significantly decrease their morbidity. Thus, determining the etiology and temporal course of malnutrition in children with HIV infection will be important for early intervention and development of re-feeding regimens. This cross-sectional study describes the nutritional status and the variables affecting it, among the children made vulnerable by HIV/AIDS. The objective of this study was to assess the nutritional status of the HIV positive children, and to study the variables affecting the nutritional status of HIV positive children.
Methods: The study involved 84 HIV positive children of 18 months - 18 years age group in the ART centre of J. A. group of hospital, Gajra Raja medical college, Gwalior, Madhya Pradesh. Anthropometric measurements, birth and maternal characteristics, socio-economic and immunization profile, past illness were recorded. Z-scores were generated using WHO standards as indicators of nutritional status and variables were assessed by suitable statistical test.
Results: Prevalence of under nutrition is very high particularly moderate and severe stunting (76.19%), moderate and severe underweight (71.42%), and moderate and severe wasting (38.09%) in under five years HIV positive children. While low height for age was observed in 60.31%, low weight for age in 34.92%, and low BMI for age was recorded in 20.63%, in 6-18 years age group. Besides HIV status, other significant determinants of nutritional outcomes include child factors, birth related factors, maternal level factors, socio-economic and past history of illness.
Conclusions: This study documents poor nutritional status among HIV positive children of 18 months-18 years age group. HIV is an independent and non-modifiable risk factor for poor nutritional outcomes in those who are already infected but an improvement in their nutritional status may significantly decrease their morbidity. Early pediatric HIV testing of exposed or at risk children, followed by appropriate health care for infected children with integration of other child survival interventions like immunization, community participation may improve their nutritional status and survival.

Keywords: ART center, HIV positive children, Nutritional status of children, Stunting, Underweight, Wasting

INTRODUCTION

Under nutrition remains one of the major contributors to child mortality. Out of 6.6 million under five deaths in 2012, nearly half were attributable to under nutrition. Some critical nutritional conditions that these deaths were attributable to include moderate and severe stunting (chronic form of under nutrition), moderate and severe wasting (acute form of under nutrition).Under nutrition puts children at greater risks of death from common infections, increase the frequency and severity of illness and delays recovery.

HIV/AIDS worsen the nutritional status of the child. In a child living with HIV/AIDS and under nutrition, both affect immune function, with lack of essential micronutrients leading to nutritionally acquired immune-dysfunction syndrome.[1,2] Compromised immune defense increase susceptibility to infectious diseases and complicate case management.[3] Under such conditions, case fatality rates in children are prone to increase even under the standard treatment guidelines of World Health Organization (WHO).[4-6] Globally 2% of under-five mortality is being contributed by HIV/AIDS.[7] Despite current global efforts to reduce under nutrition, HIV infected children remain nutritionally challenged due to socio-economic, disease, and other specific health related factors.[8] Such factors include low socio-economic status, orphan hood, food insecurity, poor dietary patterns and low maternal education.[9-11] Additionally, diarrhea is also implicated as a risk factor for under nutrition among ART-naïve HIV positive children.[9]

Achievement of millennium development goals (MDGs) 4 and 6 aimed at reducing child mortality and combat HIV/AIDS will depend in part on the ability of policymakers to address the health and nutritional status of all children in general and of children affected by HIV/AIDS in particular. HIV-infected children are malnourished; an improvement in their nutritional status may significantly decrease their morbidity. Thus, determining the etiology and temporal course of malnutrition in children with HIV infection, will be important for early intervention and development of re-feeding regimens.

Present study includes a cross-sectional analysis of nutritional status of HIV positive children and the variables affecting it. Data describing the pattern and variables affecting the nutritional status among HIV positive children of 18 months - 18 years age group has been published from the study area is lacking. The study could be a bench mark in framing policy, based on context specific evidence, in a need to improve the health and life expectancy of these vulnerable children.

The objectives of this study were to assess the nutritional status of the HIV positive children and to study the variables affecting the nutritional status of HIV positive children.

METHODS

This was a cross sectional prospective study conducted in ART Centre at J. A. group of hospitals, Gwalior, Madhya Pradesh over a period of 2 months from 1st June to 31st July 2013. Eighty four HIV positive registered children of age group 18 months - 18 years reporting to ART Centre were enrolled. Ethical approval was obtained from institutional ethical committee.

The study protocol was fully explained to parents/guardian and written informed consent was obtained. Demographic profile, birth history, maternal and paternal history, feeding, immunization, past illness history was recorded in a predesigned proforma. Anthropometric assessment was done by recording weight, height, mid arm, head circumference and body mass index as per standard method and WHO classification for malnutrition was referred to classify children into stunted, wasted and underweight. Nutritional status was determined by using height for age, weight for age and weight for height Z-scores in under 5 years age group and weight for age, height for age and BMI for age Z-scores for 6-18 years age group. Data was analysed by using various statistical technique.

RESULTS

Of the 84 HIV positive children in the study, 69% were boys and their mean age was 9.57 years and 30.9% were girls and their mean age was 9.16 years. Children born with weight <2.5 kg were 33.33% (Table 1).

Table 1: General characteristics of children with HIV/AIDS (n = 84).

Characteristics	Number	Percentage
Age		
<5 years	21	25%
6-18 years	63	75%
Total	**84**	**100%**
Sex		
Male	58	69%
Female	26	31%
Total	**84**	**100%**
Birth weight		
<2.5 kg	28	33.33%
>2.5 kg	56	66.66%
Total	**84**	**100%**

34.52% children were having either single parent or orphan. 56% women were married before 18 years, 55% mothers were illiterate and 70% of these were residing in rural areas (Table 2).

Assessment of immunization status in children under 5 year age group showed that only 33% children were fully immunized. 59.52% children belonged to class 4 and 5 of Kuppuswamy classification (Table 3).

Table 2: Maternal characteristics of children with HIV/AIDS (n = 84).

Characteristics	Number	Percentage
Age at marriage		
<18 years	47	55.95%
≥18 years	37	44.05%
Total	**84**	**100%**
Age at this child conception		
<18 years	23	27.38%
≥18 years	61	72.61%
Total	**84**	**100%**
Maternal education level		
Illiterate	46	54.76%
Primary	23	27.38%
Secondary	8	9.52%
Graduate	7	8.33%
Total	**84**	**100%**
Residence		
Urban	26	30.95%
Rural	58	69.04%
Total	**84**	**100%**

76.19% children suffered from acute watery diarrhea and 52.38% suffered from acute respiratory infections in under 5 year age group (Table 4). Only 38% children had adequate feeding during illness. Under 5 years age group, the prevalence of moderate and severe wasting was 38.09% while the prevalence of moderate and severe stunting was 76.19%. Moderate and severe underweight was recorded in 71.42% children (Table 5).

Table 3: Socio-economic classification of children with HIV/AIDS (n = 84).

Characteristics	Number	Percentage
Socio economic status		
Class I	4	4.76%
Class II	14	16.66%
Class III	16	19.04%
Class IV	49	58.33%
Class V	1	1.19%
Total	**84**	**100%**

Table 4: History of illness during last one year in children less than 5 years with HIV/AIDS (n = 21).

Type of illness	Number	Percentage
AWD	16	76.19%
ARI	11	52.38%
Others	6	28.57%
Total	**33**	**157.14%**

Among children in 6-18 years age group, the prevalence of low weight for age was 34.92% while the prevalence of low height for age was 60.31%. Low BMI for age was recorded in 20.63% children (Table 6).

Table 5: Under nutrition in children under five years with HIV/AIDS (n = 21).

Measure of malnutrition	Number of children	Percentage of children	Mean	SD	95% CI
Moderate and severe wasting (below-2SD from median weight for height/length)	8	38.09%	9	2.87	7.01-10.99
Moderate and severe stunting (below-2SD from median height for age)	16	76.19%	82.04	9.92	77.18-86.9
Moderate and severe underweight (below-2SD from median weight for age)	5	71.42%	9.96	2.66	8.61-11.31

Table 6: Under nutrition in children 6-18 years with HIV/AIDS (n = 63).

Measure of malnutrition	Number of children	Percentage of children	Mean	SD	95% CI
Weight (below-2SD from median weight for age)	22	34.92%	24.11	7.16	21.12-27.1
Height (below-2SD from median height for age)	38	60.31%	124.39	16.74	119.07-129.71
BMI (below-2SD from median BMI age)	13	20.63%	13.62	2.29	12.37-14.87

DISCUSSION

In the present study 33.33% children were born low birth weight. Consistent with other studies in developing countries, child level factors including birth weight emerged as key factor.[12] Sunguya et al also documented that HIV positive children have lower birth weight as compared to HIV negative children.[13] Birth weight was lower in HIV positive children compared to their negative counterparts as also found in other studies in sub-Saharan Africa.[14] Though further investigations are needed to establish the causes of low birth weight, one factor may

be maternal health and the impact of HIV exposure.[15] Maternal HIV infection which leads to higher rates of maternal opportunistic infections has particularly been associated with fetal growth retardation leading to smaller size and low birth weight.[16]

The present study found 34.52% HIV positive children were orphan or having single parent. Sunguya et al also asserted that HIV positive children are more likely to be orphaned and to be fed less frequently.[13]

The maternal factor found to be significantly associated with child's nutritional status was maternal age. Maternal age has been documented in other studies also as an important risk factor for child undernutrition.[17] The increased risk of under nutrition in children of younger mothers may relate to inexperience and inadequate child care, or to biological characteristics such as small maternal size with potential for low birth weight and later poor nutritional outcomes.[18] The present study also show that 55.95% mother were married before 18 years of age and 27.38% mother conceived the child before 18 years of age, also 54.76% mothers were illiterate. Area of residence serves as a proxy for various factors at community level, including environmental factors, availability of health care and support services. In present study 69.04% children were living in rural area and 30.95% children in urban area. So we conclude, maternal age and illiteracy may be associated with under nutrition of these children.

The present study document that 59.52% children belonged to class IV and V socioeconomic status as per Kuppuswamy classification. Sunguya et al asserted that households of HIV-positive children exhibited lower economic status, lower levels of education, and higher percentages of unmarried caregivers with higher unemployment rates. Food insecurity was prevalent in over half of ART-treated HIV-positive children's households.[13]

Recurrent illnesses such as diarrhea, exacerbated in HIV positive children due to lowered immunity, may play a major role in poor nutritional outcomes.[18] The present study also document the 76.19% children suffered from acute watery diarrhea.

Present study documents a high prevalence of under nutrition, particularly stunting, which is more prevalent in HIV positive children. Sunguya et al conducted a study among 213 HIV positive and 203 HIV negative 6-60 months age group and documented that 36.6% were stunted, 22.1% were underweight and 13.6% were wasted.[13] Prasanna et al studied in Bangalore, in Indian HIV positive orphans and documented that 79% were underweight, 72% stunted and 27% were wasted.[21] Gomber et al found 22% HIV positive children were wasted, 38.9% were stunted and 38.9% were both stunted and wasted.[22] Kimani-Murage et al also documented that the prevalence of stunting was more in HIV positive children in South Africa.[18] A recent study conducted on a mixed population (orphans and non-orphans) in southern India found the prevalence of underweight and stunting to be 55% and 46% respectively.[23]

Proportional growth failure is more likely in the setting of HIV infection rather than acute weight loss over a short period. A study in south India among 248 HIV positive children of age group 1-12 years found the proportion of underweight and stunted children in the population was 55% and 46% respectively and 34% of children were wasted.[17] Ram et al observed in a study in Pune, India that among 737 HIV exposed infants, 93 (13%) were HIV infected. He documented baseline prevalence of stunting (48% versus 46%), underweight (27% versus 26%) and wasting (7% versus 11%) were similar at birth ($p>0.29$), but by 12 months stunting and underweight were significantly higher in HIV-infected infants (80% versus 56% and 52% versus 29%, $p< 0.0001$).[24]

The higher vulnerability of HIV positive children to poorer nutritional outcomes in this study may be influenced by their HIV status, this was also concluded in other studies.[18] In resource-limited settings like India this impact of HIV on children and families is further compounded by the fact that many families live in communities which are already disadvantaged by poverty, poor infrastructure and limited access to basic services. The limitations of our study include small sample size and short study period.

CONCLUSION

The nutritional indicators in HIV children are very alarming. Early pediatric HIV testing of exposed or at risk children, followed by appropriate medical care including antiretroviral treatment and nutritional supplementation to infected children may improve their nutritional status. In addition to HIV status, other child's, maternal and community-level characteristics emerge as strong determinants of nutritional outcomes in these children. Interventions that effectively counter under nutrition are paramount if we are to address the squeal of poor child nutrition: poor cognitive development reduced human capital, premature mortality and other health consequences. Special attention should be given to integration with child survival interventions such as immunization, nutrition and community involvement, if we want to achieve millennium development goals.

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