Comparison of nutritional status of HIV positive children with homecare and institutional care/orphanage – An eye opener cross sectional study

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ABSTRACT

Background: Nutrition has an important bearing on the health of Human immunodeficiency virus (HIV) positive children. Ascertaining the nutritional demands correctly and provisioning the nutritional needs to HIV positive/ Acquired Immunodeficiency syndrome (AIDS) children will go a long way in maximizing the therapeutic benefits reaped through ever improving pharmaceutical initiatives, and thus, contribute to prolonging the longevity of these children who have a whole life ahead of them. Objectives: To study the nutritional status, including dietary assessment and anemia status of HIV-positive children, and compare the outcomes among children under homecare (staying with families) and orphange/ institutional care. Methodology: A cross sectional study was carried out among children between 2 and 15 years who were attending Pediatric Outpatient department (OPD) of a tertiary care hospital in western Maharashtra. Data were collected from 106 children by the interviewer himself using pretested validated questionnaire along with anthropometric measures and relevant blood tests. A 24-h recall method was used to collect the dietary intake. Institutional ethical clearance was taken, and data were collected through informed consent of the parent/guardian accompanying the children. Results: Out of the 106 subjects studied, 54 (50.9%) were living in orphange and 52 (49.1) were living with the family. Out of the 52 subjects of children under caregivers, 48.1% of the caregivers were unskilled workers and more than half of the subjects had a monthly family income of less than Rs 3,000. About 46.1% of the subjects’ caregivers were illiterate. In the orphanage, 28 (51.8%) were males and 26 (48.2%) were females; 52 (49.1%) children were living with family of whom 30 (57.7%) were males and 22 (42.3%) were females. The prevalence of anemia (86.5%) and undernutrition (61.1%) was more among those living with family compared to the orphans living in orphanges and the same was statistically significant (P < 0.05). Among the children living in orphanges, the mean intake for most of the nutrients was more across all age groups. Within homecare, the mean nutrient intake of the females for all nutrients was more than the males across all age groups except 3–9 years, where it was more in males. Overall, all the children received less of water-soluble vitamins compared to recommended daily allowances (RDA), and the children of age group 5–15 years received less vitamin A and iron also. Conclusion: Adequate nutrition, which is best achieved through the consumption of a balanced healthy diet, is vital for health and survival for all HIV-infected children. Specific measures to be directed to children under homecare and measures directed to improve social factors need to be undertaken.

Keywords: HIV-positive children, homecare, nutrition, orphanage

Introduction

With an estimated 37.7 million adults living with HIV around the world,¹ a large number of children have families living with HIV or who have died with AIDS. These children may themselves experience the discrimination that is often associated with HIV. They have to also care for a sick parent and give up school to become the principal wage earners for the family. When adults fall sick, food is still required to be provided and the burden of earning money falls on the oldest child.
One of the harshest effects of the global AIDS epidemic is the number of orphans it has created and continues to create. Some AIDS orphans are adopted by their grandparents or other extended family members, but many are left without any support.[2] Child-headed households as a result of AIDS are common in some areas, with the older children feeding for themselves and their siblings. Good nutrition is critical for people living with HIV/AIDS. Inadequate dietary intake and infectious diseases are the most significant immediate causes of malnutrition.[3] As HIV/AIDS is a complex of primary viral infection (HIV) and associated opportunistic infections, the interaction of malnutrition and infection is fundamental. The World Health Organization report on food and nutrition for people living with HIV/AIDS states: “HIV/AIDS and malnutrition both are highly prevalent in many parts of the world, especially in Sub-Saharan Africa. These effects are interrelated and exacerbate one another in vicious cycle.”[4] Basically, good nutrition should be viewed as an essential co-therapy that helps maximize medical management of HIV, prevent, and delay the loss of muscle mass or wasting, strengthen the immune system, reduce viral mutation, decrease the incidence, and severity of opportunistic infections and hospitalization and lessen the debilitating symptoms of HIV/AIDS.

It is clear that nutrition has an important bearing on the health of HIV-positive children. Ascertaining the nutritional demands correctly and provisioning the nutritional needs to HIV-positive/ AIDS children will go a long way in maximizing the therapeutic benefits reaped through the ever-improving pharmaceutical initiatives, and thus, contribute to prolonging the longevity of these children who have a whole life ahead of them. The primary care providers and family physicians are the primary contact with these children during detection/follow-up, and in turn, these HIV-positive children are to be looked after with utmost care. This study is, therefore, carried out to study the nutritional status, including dietary assessment and anemia status of these children in our local setting, and compare the outcomes among children under homecare staying with families and orphanages/institutional care. The findings would, thus, help the primary care providers and family physicians in providing efficient care to these children.

Methodology

A cross-sectional study was carried out among children between 2 and 15 years who were attending the Pediatric OPD of a tertiary care hospital in western Maharashtra. All children who attended the OPD for a routine checkup during the specified time interval were included in the study. Data were collected from 106 children by the interviewer himself using pretested validated questionnaire along with anthropometric measures and relevant blood tests. A 24 h recall method was used to collect the dietary intake and anthropometric measurements were carried out using standard protocols. Institutional ethical clearance was taken, and data were collected through informed consent of the parent/guardian accompanying the children. Data were entered in an Excel sheet and analyzed using SPSS Ver 18.

Results

Out of the 106 subjects studied, 54 (50.9%) were living in orphanages and 52 (49.1) were living with families [Table 1]. Out of the 52 subjects of children under caregivers, 25, about half (48.1%) of the caregivers are unskilled workers, one-third (36.5%) semiskilled, and very few, 3 (5.8%), were clerical/shop/farm owners. The monthly family income could be ascertained only for the HIV-positive children looked after by either the father, mother, or relative. The rest of the children were living in orphanages for which it was not possible to ascertain the monthly family income. More than half of the subjects had a monthly family income of less than Rs 3,000 and only 6 (11.5%) had income between Rs 5,000 and 7,500. Half of all (46.1%) of the subjects’ caregivers were illiterate, and 3.8% had intermediate education levels [Table 2]. In the orphanage, 54 (50.9%) subjects were living of whom 28 (51.8%) were males and 26 (48.2%) were females; 52 (49.1%) subjects were living with families of whom 30 (57.7%) were males and 22 (42.3%) were females.

The prevalence of anemia and undernutrition was more among those living with families compared to the orphans living in orphanages and the same was statistically significant ($P < 0.05$) [Tables 3 and 4].

The diet survey is the scientific assessment of food consumption, and for various purposes including the assessment of nutritional status. In the present study, data on diet intake were assessed through the 24-h recall method. Based on the analysis of Figures 1–5, the following can be summarized in Table 5.

| Table 1: Distribution of children as per caregiver |
|--------------------------------------------------|
| Caregiver | No. of subjects (n) | Percentage |
|----------|---------------------|------------|
| Orphanage| 54                  | 50.9%      |
| Family*  | 52                  | 49.1%      |
| Total    | 106                 | 100%       |

*Family means HIV-positive children looked after by either father, mother, or relative.

| Table 2: Sociodemographic profile of caregiver children (living with family, n=52) |
|----------------------------------------------------------------------------------|
| Frequency | Percent |
|----------|---------|
| Caregiver* (Non-Orphans) |
| Unskilled | 25 | 48.1% |
| Semiskilled | 19 | 36.5% |
| Skilledworker | 5 | 9.6% |
| Clerical/shop/farm | 3 | 5.8% |
| Income (Rs) |
| <1000 | 0 | 0% |
| 1000-2999 | 29 | 55.8% |
| 3000-4999 | 17 | 32.7% |
| 5000-7499 | 6 | 11.5% |
| Education Levels |
| Illiterate | 24 | 46.1% |
| Primary | 11 | 21.2% |
| Middle | 11 | 21.2% |
| Secondary | 4 | 7.7% |
| Senior secondary | 2 | 3.8% |

*Children living with a family dependent on a ‘caregiver’ (parents or relatives)
Discussion

As per the US report on food and nutrition for people living with HIV/AIDS, HIV/AIDS and malnutrition—both are highly prevalent in many parts of the world, especially in developing countries. These effects are interrelated and exacerbate one another in a vicious cycle. Children need special nutrition because they are in the phase of growth. Their intense physical activity increases the nutrient demands and makes them even more vulnerable to the effect of malnutrition. Special attention should be paid to the nutritional status of children which directly affects their health, physical (and mental) growth, and development. Good nutrition is critical for people living with HIV/AIDS. Inadequate dietary intake and infectious diseases are the most significant immediate causes of malnutrition. This study has tried to compare the nutritional status of HIV-positive children staying in families and institutional care/orphanage in terms of malnourishment, anemia status, and dietary intake.

Comparison with orphan children

A study was carried out in Rakai district, Uganda, by Kikafunda et al. to assess the nutritional status of HIV/AIDS-orphaned children (<10 years) living with their elderly relatives as compared to non-orphaned children living with both parents in ordinary homes. The results revealed high levels of malnutrition among orphaned children as almost half of them (47%) were found to be underweight. This level of underweight was significantly ($P < 0.05$) higher than the figure of 28% found in the children with both parents. In the present study, however, the prevalence of underweight among subjects living with the family was 80.8% compared to 61.1% among those living in

| Table 3: Undernutrition in orphan subjects and those living with family |
|-----------------|-----------------|----------|-----------------|-----------------|
| Caregiver       | Weight for Age  | $P$ value |
|                 | Normal | Mild | Moderate | Severe | Total |
|                 | $n$ | %    | $n$ | %    | $n$ | %    | $n$ | %    | $n$ | %    |
| Orphans         | 21   | 38.9 | 5   | 9.3  | 6   | 11.1 | 22  | 40.7 | 54  | 100  |
| Subjects living with family | 10 | 19.3 | 14 | 26.9 | 19 | 36.5 | 9 | 17.3 | 52  | 100  |

$\chi^2$: 20.34, $d$: 3, $P$: 0.0001

| Table 4: Grades of anemia in children between 2 and 6 years as per caregiver |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| Grades of Anemia | Caregiver        | Total           | $P$ value       |
|                  | Living with Family | Orphanage |                  |
| 2-6 years        |                 |                 |                 |
| Normal           | 3 (23.1%)        | 10 (76.9%)      | 13 (100%)       | $\chi^2$: 8.02, $d$: 2, $P$: 0.0181 |
| Mild             | 6 (75%)          | 2 (25%)         | 8 (100%)        |
| Moderate         | 13 (68.4%)       | 6 (31.6%)       | 19 (100%)       |
| Total            | 22 (55%)         | 18 (45%)        | 40 (100%)       |
| 6-15 years       |                 |                 |                 |
| Normal           | 4 (100%)         | 0 (0%)          | 4 (100%)        | $\chi^2$: 9.4043, $d$: 3, $P$: 0.0244 |
| Mild             | 12 (52.2%)       | 11 (47.8%)      | 23 (100%)       |
| Moderate         | 11 (31.4%)       | 24 (68.6%)      | 35 (100%)       |
| Severe           | 3 (75%)          | 1 (25%)         | 4 (100%)        |

| Table 5: Summary of age-wise dietary assessment of children living in orphanage and homecare |
|-----------------|-----------------|-----------------|-----------------|
| Age group of children | Mean intake of nutrients (orphanage vs. homecare) | Mean intake of nutrients (within homecare) | Overall view for children living in orphanage and homecare |
| 2-3 years        | Children living in orphanages, the mean intake for most of the nutrients is more | Mean nutrient intake of females for all nutrients is more than males | Receiving less water-soluble vitamins compared to RDA |
| 3-5 years        |                                  | Mean nutrient intake of males for all nutrients is more than females | Receiving less water-soluble vitamins, vitamin A and iron compared to RDA |
| 5-9 years        |                                  | Mean nutrient intake of females for all nutrients is more than males | |
| 9-12 years       |                                  |                                  | |
| 12-15 years      |                                  |                                  | |

Figure 1: Distribution of the mean intake of energy of children as per age, sex, and caretaker

Figure 2: Distribution of protein intake of children as per age, sex, and caretaker

Journal of Family Medicine and Primary Care

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Volume 11 : Issue 5 : May 2022
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Journal of Family Medicine and Primary Care 1926 Volume 11 : Issue 5 : May 2022

the orphanage. This disparity could be explained by the fact that orphanage being a well-run institutional setting provided better nutritional care to its inmates, as compared to children living with family.

Children aged 2–3 years
The males living with the family were receiving total calorie 26.4% less than recommended daily allowances (RDA) compared with females who were receiving 0.2% less than RDA. The average dietary intake of energy, carbohydrate, iron, vitamin A, vitamin B2, niacin, and vitamin C was lower than the recommended daily allowance in males. A similar trend was seen in girls as well, where the energy, carbohydrate, iron, vitamin A, niacin, and vitamin C intake was lower than the recommended daily allowance. However, the intake of protein and fat was higher than the RDA among various subgroups. Children aged 2–3 years did not consume the recommended daily intake of calories based on their compiled diet survey data, and in general, their consumption of water-soluble vitamins was below the RDA.

Children aged 3–5 years
The average dietary intake of energy, carbohydrate, iron, vitamin A, vitamin B2, niacin, and vitamin C was lower than the recommended daily allowance in males. A similar trend was seen in girls as well where the energy, carbohydrate, iron, vitamin A, niacin, and vitamin C intake was lower than the recommended daily allowance. However, the intake of protein and fat was higher than the RDA among various subgroups.

Studies conducted by Aggarwal and Singh (2002) on preschool children of Delhi also indicated that though the consumption of protein was above the RDA level, yet children were caloric-deficient. A similar trend is seen in the current study where the intake of protein and fat is higher than the RDA in various subgroups. Here, the socioeconomic status of the children is much better than the national average. Similar results have been reported by Laxmaiah et al. in their study on rural preschool children in Punjab. Here, a higher proportion of preschool children were consuming diets which were inadequate with respect to energy, fat, iron, riboflavin, vitamin A, and vitamin C.

Children aged 5–9 years
The average dietary intake of energy, carbohydrate, iron, vitamin A, vitamin B2, niacin, and vitamin C was lower than the recommended daily allowance in males. A similar trend was seen in girls as well, where the energy, carbohydrate, iron, vitamin A, niacin, and vitamin C intake was lower than the recommended daily allowance. However, the intake of fat was higher than the RDA among various subgroups.

Children aged 9–12 years
The average dietary intake of energy, carbohydrate, iron, vitamin A, vitamin B2, niacin, and vitamin C was lower than the recommended daily allowance in males. A similar trend was seen in girls as well, where the energy, carbohydrate, iron, vitamin A, niacin, and vitamin C intake was lower than the recommended daily allowance. However, the intake of fat was higher than the RDA among various subgroups.

As per the National Nutrition Monitoring Bureau (NNMB) report for the year 1990–1992, a study carried out on (non-HIV-positive) children between 6 and 11 years old, in eight states, revealed that
there was a deficit of the magnitude of 620 kcal of energy and 6–7 g protein per day. The present study, in the age group of 5–9 years, revealed that there was a mean energy deficit of 436 kcal and proteins 6 g per day, while in the age group of 9–12 years, the mean deficit of energy was of the magnitude of 545 kcal and protein 11.7 g per day.

**Children aged 12–15 years**

The average dietary intake of energy, carbohydrate, iron, vitamin A, vitamin B2, niacin, and vitamin C was lower than the recommended daily allowance in males. A similar trend was seen in girls as well, where the energy, carbohydrate, iron vitamin A, niacin, and vitamin C intake was lower than the recommended daily allowance. However, the intake of fat was higher than RDA among various subgroups.

A diet survey in the present study revealed that the average dietary intake of energy, carbohydrate, iron, vitamin B1, vitamin B2, niacin, and vitamin C was lower than the recommended daily allowance among males and females. In general, dietary intake among those living in the orphanage was better than those living with the family. The reason for this disparity could be that an orphanage is an organized institution that provides at least the basic amenities of food, hygiene, and adequate medical care to these otherwise deprived HIV-positive children. On the contrary, those living with family typically belong to a lower socioeconomic status. Their economic avenues are limited; moreover, the care of an HIV-positive child is discriminated against. Often, the parents are not alive, and the child is looked after by other relatives who have a discriminatory attitude toward these ‘step-children.’ There is poor nutrition education in the community and a poor understanding of the nutritional requirements of an HIV-positive child. As a result, the child is nutritionally neglected. Moreover, very often, this child may contract various infections, the management of which will also be compromised owing to the lack of resources, poor appreciation of the problem, lack of knowledge, and discrimination. Many of these issues are taken care of in an orphanage setting in a better manner.

The diet survey revealed that the intake of food for children living in the orphanage in the forms of cereal, pulses, fat and oil, sugar, milk, vegetables, fruits, and roots was better than those children living with family. However, the average dietary intake of energy, carbohydrate, iron, vitamin B2, niacin, and vitamin C was lower than the recommended daily allowance in children in both settings. This dietary intake inadequacy may have been the dietary factor contributing to the prevalence of acute and chronic malnutrition.

On further analysis in the age group 2–6 years as per caregiver, it was observed that 86.4% of the subjects living with the family were anemic, while only 44.4% of the subjects living in the orphanage were anemic and this was statistically significant (P-value < 0.05).

In a study carried out by Swetha et al. on HIV-positive children staying in the orphanages of Hyderabad, India, showed 46.8% were malnourished and 45.5% were anemic; 14.3% had vitamin A deficiency, 48.1% folate, and 49.3% iron deficiency. The mean energy intakes were less in all groups in comparison with RDA similar to our study. While in the other studies carried out in India, the undernutrition prevalence had ranged from 17 to 63%. The folate and iron deficiencies were also noted in the studies carried out by Castro et al. in Brazil and Steenkamp et al. in Manguang. All these factors have a major impact and accelerate the disease progression. Thus, the micronutrient deficiency and malnutrition in HIV-positive children, both in orphanages and home caregivers, need to be tackled at the highest priority with specific measures, especially for children who are looked after by the families. This also requires addressing socioeconomic issues for the households who have multiple people with HIV positivity.

Even studies carried out outside India like a study carried out in Kenya by Braitstein et al. also showed children in household care and street youth were more likely than children under institutional care to develop malnutrition which in turn accelerate the disease progression. The important factor highlighted in this study for children under household is due to food insecurity and job insecurity for parents who themselves are HIV-positive. Apart from undernutrition, 15–20% of the children had overweight/obesity issues too. A similar situation is increasingly evident in developing nations which needs to be studied upon and measures be directed toward them. The findings of this study would thus help the primary care providers and family physicians in providing efficient care to these children. They should always consider these findings while dealing with HIV-positive children of different age groups and take proactive measures in preventing and managing malnutrition. They should provide effective nutritional counseling. Children who are under malnutrition should be kept under surveillance to monitor their growth.

**Conclusion**

Since the causes of malnutrition are complex and multiple, this study could highlight some of these factors. Adequate nutrition, which is best achieved through the consumption of a balanced healthy diet, is vital for health and survival for all HIV-infected children. Specific measures to be directed to children under homecare and measures directed to improve social factors need to be undertaken. The children detected to be suffering from acute or chronic malnutrition should be given immediate attention by the concerned health authorities and should be kept under surveillance to monitor their growth.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) guardian has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.
Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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