Additional risk factors for malnutrition in children infected with HIV

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Abstract

Introduction: HIV infection affects the nutritional status, due to increased energy requirements in patients. This study looked for susceptible factors that could increase under nutrition in children living with HIV. Material and method: The mothers/caregivers were interviewed on the feeding of the patients with reference to the 7 basic food groups which enable to estimate the Individual Dietary Diversity Score (IDDS) of children infected with HIV. The quantity and daily frequency of meals as well as their nutritional status was assessed. Results: More than half (58.5%) of the patients were aged 12-35 months. Weaning was done before 6 months in 19.3%, and most of them (91.0%) consumed at least 3 meals daily. In 60.0%, the mothers/guardians practiced dietary restrictions; this concerned beans (18.5%), cow milk (10.7%), eggs (7.6%), and pork (7.4%). The IDDS was weak in 34.0% patients. The risk of having malnutrition was increased in children of uneducated mothers/guardians (P=0.000) and when only 3-5 nutrients’ groups were used to enrich porridge. The protective factors against malnutrition were introduction of complementary foods after the age of 6 months (P=0.000), absence of food restriction (P=0.008). Conclusion: Proper feeding would prevent malnutrition in children inspite of the risk due to HIV infection. In the present study, feeding of children living with HIV was not sufficiently diversified. The reinforcement of nutritional education of mothers/guardians is crucial.

Keywords: Children, HIV, Malnutrition, Factor, Addition, Feeding.

INTRODUCTION

Malnutrition is one the most frequent causes of death in young children. Many factors such as loss of appetite, gastroenteritis and respiratory infections which expose the children to emaciation are responsible for this [1]. Risk of malnutrition is higher in subjects infected with HIV [2] as well as a higher death risk when these two affections coexist [2,3]. In fact, malnutrition and HIV/AIDS make up a vicious circle responsible for many severe complications. Anticipating the implementation of a balanced diet is crucial considering the increased energy needs of patients infected with HIV. The importance of improving competence of the population and health personnel in health promoting activities has been demonstrated[4]. The HIV epidemic came at a time when human resources in the health sector were not adequate for proper nutritional management of children. Efforts to curb malnutrition are impeded by a deficit in competent personnel in the dietary domain [4]. These personnel play an important role in nutritional education with parents [5]. Parents’ knowledge play an important role on the feeding of children and are influenced by cultural constraints as well as parents social status [6]. Actually, feeding practices and traditional dietary restrictions affect feeding in children [7,8]. In Ethiopia, these were associated with an insufficiently diversified complementary feeding in infants infected with HIV [9]. The aim of this study was to describe certain factors that can aggravate malnutrition in children infected with HIV.

MATERIAL AND METHOD

A transversal study was carried out in children infected with HIV aged between 6-59 months followed up at the day unit of the mother and child center in Yaounde. A semi-structured interview was carried out with mothers/guardians on their sociodemographic and economic characteristics as well as the health status of living mothers. Each patient underwent a dietary survey by means of a dietary recall. This consisted in a qualitative registration of all food groups consumed by the children during 3 days before the interview. The number of meals per day as well as dietary restrictions was also noted. We described the mode of feeding of patients from birth, for those who were at least breastfed, the age of breastfeeding withdrawal and the time of weaning. For those who consumed porridges, the daily quantity was estimated with point of reference a 250ml bowl; the quality was evaluated based on 7 food groups used to enrich it. These were (1) roots, cereals, tubercles; (2) dairy products; (3) meat products and eggs; (4) fats and oils;
(5) fruits and vegetables rich in vitamin A; (6) legumes and nuts; (7) and other fruits and vegetables \([10]\). The porridge was said to be of good, of average or of bad quality if it was constituted of at least 5, 3-5, or 1-2 food groups respectively. Aside from porridges, dietary diversification was also evaluated using the patients' individual dietary diversity scores. This was low, average or high if patients had received less than 2, between 3-5 or more than 5 food groups respectively. The number of meals consumed daily as well as the quantity was estimated using the same volume of 250ml. Children less than 12 months of age were not frequently fed if they received less than 2 meals or less than 2 bowls of porridge daily. In patients aged over 12 months, a minimum of 3 meals was required aside from breastfeeding or baby milk in take. Mothers'/guardians' knowledge on malnutrition was also evaluated. Anthropometric indices weight/height (W/H), height/age (H/A), and mid upper arm circumference (MUAC) were obtained from the medical files of patients. Acute malnutrition was defined by a W/H index< -2 Z-score or MUAC< 125mm; it was said to be chronic when H/A < -2 Z-score. For this study however, only acute malnutrition was of interest.

Statistical analysis

Categorical variables were described by the frequency by means of a univariate analysis. Using bivariate analysis, we sort out the existence of a relationship of dependency between malnutrition and certain explicative variables. The Khi2 test was used to test the dependency hypothesis, considering \( p \) values < 0.05 as the threshold for significance. The influence of variables suspected to have a possible effect on malnutrition was sort out using an analysis.

Ethical considerations

This study obtained approbation from the national ethics board. We obtained consent from the participants and we also respected confidentiality. No invasive acts linked to drawing of blood which could compromise the subjects' health were carried out.

RESULTS

Description of the study population

A total of 200 respondents were interviewed amongst which were 162 mothers (81.0%) and 38 (19.0%) guardians of patients whose mothers were deceased. Most of the living mothers (130/162 making 80.2%) were in good health; only 32 (19.8%) were manifesting disease at the time of the survey. Most of the mothers/guardians were married (111 making 55.5%), the rest were single (76 making 38.0%). About 4/5 (161 i.e. 80.5%) resided in Yaounde and 137 (68.5%) had at least attained a secondary or higher level of education. Monthly revenue was less than 25000 francs CFA in 74 (37.0%). More than 2/5 (45.0%) practiced a liberal profession or business or agriculture (Table 1). More than half (58.5%) of patients infected with HIV were aged between 12-35 months.

Table 1: Sociodemographic Characteristics of Children and Profile of Respondents

| Modalities                                | Variables | Frequency | Percentage |
|-------------------------------------------|-----------|-----------|------------|
| Characteristics of children               | Age (months) | 12-35     | 117        | 58.5       |
|                                           |           | 36-59     | 83         | 41.5       |
|                                           | Sex       | Male      | 79         | 39.5       |
|                                           |           | Femelle   | 121        | 60.5       |
| Characteristics of mothers/guardians of children | Place of residence | Yaounde    | 161        | 80.5       |
|                                           |           | Out of Yaounde | 39   | 19.5       |
|                                           | Vital status of the begetter mother | Deceased   | 38         | 19.0       |
|                                           |           | Alive     | 162        | 81.0       |
|                                           | Health status of the begetter mother | Sick       | 32         | 19.8       |
|                                           |           | In good health | 130 | 80.2       |
|                                           | Matrimonial status of respondents | Married    | 111        | 55.5       |
|                                           |           | Single    | 76         | 38.0       |
|                                           | Religion of respondents | Catholic   | 88         | 44.0       |
|                                           |           | Protestant | 47         | 23.5       |
|                                           |           | Muslem    | 30         | 15.0       |
|                                           | Number of children treated for | < 3        | 80         | 39.6       |
|                                           |           | ≥ 3       | 120        | 60.4       |
|                                           | Level of education of respondents | Secondary/higher | 137 | 68.5       |
|                                           |           | Primary   | 52         | 26.0       |
|                                           |           | Uneducated/qur’an | 11   | 5.5        |
|                                           | Monthly revenue of respondents | < 25000 FCFA | 74   | 37.0       |
|                                           |           | 25000-50000 FCFA | 57   | 28.5       |
|                                           |           | ≥ 50000 FCFA | 69   | 34.5       |
|                                           | Profession of respondents | administrator or student | 68   | 34.0       |
|                                           |           | Trader    | 67         | 33.5       |
|                                           |           | Housewife | 42         | 21.0       |
|                                           |           | Farmer    | 23         | 11.5       |
Table 2: Knowledge of Mothers/Guardians and Feeding Habits

| Variables                                                      | Modalities   | Number | Percentage |
|---------------------------------------------------------------|--------------|--------|------------|
| Do you know about malnutrition?                               | Yes          | 164    | 82.0       |
|                                                              | No           | 36     | 18.0       |
| Have you ever received counseling on nutrition?               | Yes          | 160    | 80.0       |
|                                                              | No           | 40     | 20.0       |
| Do you use different ingredients to prepare porridge for your child? | Yes | 70     | 35.0       |
|                                                              | No           | 130    | 65.0       |

Feeding practices in children

| How did you feed the child at birth?                          | Breastfeeding | 99     | 49.5       |
|                                                              | Baby milk     | 60     | 30.0       |
|                                                              | Mixed feeding | 41     | 20.5       |
| For how long did you breastfeed the child? (N=140)            | < 6 months    | 27     | 19.3       |
|                                                              | ≥ 6 months    | 113    | 80.7       |
| What age was your child at the time of dietary diversification (months) | < 6 | 77     | 55.0       |
|                                                              | > 6           | 63     | 45.0       |
| How many meals does the child have in a day?                  | 1 – 2         | 18     | 9.0        |
|                                                              | ≥ 3           | 182    | 91.0       |
| What quantity of porridge does the child consume in a day? (number of bowls) | ≥ 2 | 23     | 11.5       |
|                                                              | < 2           | 133    | 66.5       |

How would you describe the quality of ingredients used to enrich porridges (N=156)

| Quality of ingredients used to enrich porridges | Bad | 52 | 33.3 |
|                                                | Average | 55 | 35.3 |
|                                                | Good | 49 | 31.4 |

Consumption of different varieties of complementary foods

| Consumption of different varieties of complementary foods | Yes | 70 | 35.0 |
|                                                           | No | 130 | 65.0 |

Do you practice dietary restrictions?

| Do you practice dietary restrictions? | Yes | 120 | 60.0 |
|                                       | No | 80 | 40.0 |

Individual dietary diversity scores

| Individual dietary diversity scores | Low | 68 | 34.0 |
|                                    | Average | 66 | 33.0 |
|                                    | High | 66 | 33.0 |

Systematic washing of hands

| Systematic washing of hands | Yes | 107 | 53.5 |
|                            | No | 63 | 31.5 |
|                            | Yes | 66 | 33.0 |

Is the child’s weight taken regularly?

| Is the child’s weight taken regularly? | Yes | 71 | 35.5 |
|                                        | No | 63 | 31.5 |
|                                        | At times | 63 | 31.5 |

Table 3: Influence of Sociodemographic Characteristics on the Nutritional Status of Children Living With HIV

| Variables                                           | Total | Malnutrition | OR  | P   |
|-----------------------------------------------------|-------|--------------|-----|-----|
|                                                    |       | Yes n(%)     | Non n(%) |     |
| Characteristics of children                         |       |              |      |     |
| Sex                                                |       |              |      |     |
| Male                                               | 79    | 21 (26.6)    | 58 (73.4) | 0.206 |
| Female                                             | 121   | 23 (19.0)    | 98 (81.0) | 0.75 |
| Age (months)                                       |       |              |      |     |
| 12-35                                              | 117   | 36 (30.8)    | 81 (69.2) | 0.000 |
| 36-59                                              | 83    | 8 (9.6)      | 75 (9.4) | 0.09a |
| Characteristics of mothers/guardians               |       |              |      |     |
| Place of residence                                 |       |              |      |     |
| Yaounde                                            | 161   | 27 (16.8)    | 134 (83.2) | 0.206 |
| Out of Yaounde                                     | 39    | 17 (43.6)    | 22 (56.4) | 4.78 |
| Vital status of the begetter mother                 |       |              |      |     |
| Deceased                                           | 38    | 7 (18.4)     | 31 (81.6) | 2.3 |
| Alive                                              | 162   | 37 (81.6)    | 115 (18.4) | 1.3 |
| Health of living begetter mother                    |       |              |      |     |
| Sick                                               | 32    | 16 (50.0)    | 16 (50.0) | 1.3 |
| Good health                                        | 130   | 21 (16.2)    | 109 (83.8) | 0.000 |
| Marital status of mothers/guardians                |       |              |      |     |
| Single                                             | 76    | 17 (22.5)    | 59 (77.6) | 2.08b |
| Divorced/widow                                     | 13    | 20 (18.0)    | 91 (82.0) | 2.36 |
| Married/union                                       | 111   | 7 (53.9)     | 6 (46.1) | 2,36 |
| Religion                                            |       |              |      |     |
| Catholic                                           | 88    | 21 (23.9)    | 67 (76.1) |     |
About 4/5 (169 i.e. 82.0%) of mothers/guardians had knowledge on malnutrition (Table 2). At birth, 99 patients (49.5%) were breastfed; 41 (20.5%) received mixed feeding. Weaning was done before the age of 6 months for 27 (19.3%) and most of the patients i.e. 182 (91.0%) had at least 3 meals daily. In 120 (60.0%), mothers/guardians practiced dietary restrictions. These concerned certain legumes at least 3 meals daily. In 120 (60.0%), mothers/guardians practiced dietary restrictions. These concerned certain legumes 120 (60.0%), mothers/guardians practiced dietary restrictions. These concerned certain legumes.

Table 4: Knowledge and Feeding Practices of Mothers/Guardians; Followup of Growth and Impact on the Nutritional Status of Children Living with HIV

| Variables                                      | Total | Malnutrition (%) | OR | P   |
|------------------------------------------------|-------|------------------|----|-----|
| Are you aware about malnutrition?              |       |                  |    |     |
| Yes                                            | 164   | 30 (18.3)        | 134 (81.7) | 3.2   | 0.007 |
| No                                             | 36    | 14 (38.9)        | 22 (61.1) | 0.004 |
| Have you ever received counseling on nutrition?|       |                  |    |     |
| Yes                                            | 160   | 30 (18.7)        | 130 (81.3) | 0.026 |
| No                                             | 40    | 14 (35.0)        | 26 (65.0) | 1.94  |
| How did you feed the child at birth?           |       |                  |    |     |
| Breastfeeding                                  | 99    | 26 (26.3)        | 73 (73.7) | 0.334 |
| With                                           | 60    | 10 (16.7)        | 50 (83.3) | 1.18  |
| Mixed                                          | 41    | 8 (19.5)         | 33 (80.5) | 0.22  |
| What was the duration of breastfeeding (months) |       |                  |    |     |
| < 6                                            | 27    | 10 (37.0)        | 17 (63.0) | 0.67  |
| ≥ 6                                            | 113   | 34 (19.4)        | 91 (80.6) | 0.039 |
| At what age (months) did you start with other foods? |       |                  |    |     |
| < 6                                            | 77    | 25 (32.1)        | 52 (67.3) | 0.000 |
| ≥ 6                                            | 63    | 6 (8.9)          | 57 (91.1) | 0.15  |
| How many meals per day does the child have?    |       |                  |    |     |
| 1 - 2                                          | 18    | 5 (27.8)         | 13 (72.2) | 0.42  |
| ≥ 3                                            | 182   | 39 (21.2)        | 143 (78.8) | 0.518 |
| What quantity of porridge does the child consume per day (in bowls)? | 23    | 4 (17.4)         | 19 (82.6) | 0.48  |
| < 2                                            | 133   | 30 (22.6)        | 103 (77.4) | 0.62  |
| How do you enrich porridge? (quality of ingredients used) |       |                  |    |     |
| Bad                                            | 52    | 17 (32.7)        | 35 (67.3) | 0.005 |
| Average                                        | 55    | 12 (21.8)        | 43 (78.2) | 1.74  |
| Good                                           | 49    | 6 (12.2)         | 43 (87.8) | 0.48  |
| Is the child food diversified?                  |       |                  |    |     |
| Yes                                            | 70    | 7 (10.0)         | 63 (90.0) | 9.04  |
| No                                             | 130   | 37 (28.5)        | 93 (71.5) | 0.003 |
| Have you forbidden foods?                      |       |                  |    |     |
| Yes                                            | 120   | 34 (28.3)        | 86 (71.7) | 0.008 |
| No                                             | 80    | 10 (12.5)        | 70 (87.5) | 0.7   |
| IDDS                                           |       |                  |    |     |
| Low                                            | 68    | 19 (27.9)        | 49 (72.1) | 1.50  |
| Average                                        | 66    | 12 (18.2)        | 54 (81.8) | 0.472 |
| High                                           | 66    | 14 (21.2)        | 52 (78.8) | 19.51 |
| Is the child’s weight taken regularly?          |       |                  |    |     |
| Yes                                            | 66    | 8 (12.1)         | 58 (87.9) | 0.000 |
| No                                             | 71    | 28 (39.4)        | 43 (60.6) | 0.01  |

*p<0.1 ; †p<0.05 ; ‡p=0.01 ; IDDS: Individual dietary diversity score

Description of feeding practices of mothers/guardians

Malnutrition was observed in 44 patients with a prevalence of 22.0%. The age range from 12-35 months was most affected (30.8%). Malnutrition predominated (81.6%) in patients whose mothers were still alive and affected over half (53.9%) of those whose mothers were living as a couple; either married or living in common-law (Table 3). Furthermore, malnutrition was noted predominantly (63.6%) in subjects whose mothers/guardians were uneducated (p< 0.000). There was an association between the quality of ingredients used to enrich

Characteristics of patients with acute malnutrition

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porridges and malnutrition \( (p = 0.005) \) as well as consumption of different food varieties \( (p = 0.003) \); (Table 4). Protective factors against malnutrition were the introduction of complementary foods after the age of 6 months \( (p = 0.000) \), and not practicing dietary restrictions in children \( (p = 0.008) \).

**DISCUSSION**

Limits of the study: Certain confounding factors such as the level of the household income act and in association with the quality of the habitat on the direct causes of malnutrition in children. It would be illusory to focus on sociodemographic, economic and nutritional factors to explain malnutrition in children. We did not carry out a survey of family life inorder to determine explanatory factors for malnutrition in the study population. The relational aspect of malnutrition was not explored, such as breakups, nursing, child-entourage relationships, discriminatory attitudes, perception, mother’s feeling about her status and the child’s disease; these situations could influence the nutritional status and feeding habits vis-a-vis children \[11\].

HIV infection greatly affects the weight3 and the growth of the child \[12\]. In a study carried out on severe malnutrition in Yaounde, children infected with HIV were 3.8 times more emaciated than the others \[21\]. The objective of our survey was to determine possible factors that could influence nutritional status in children 12-59 months of age who were already predisposed to malnutrition due to HIV infection. Despite the fore mentioned limits, it is logical to affirm that the occurrence of malnutrition in subjects infected with HIV is influenced by mothers’ knowledge, sociodemographic factors, cultural factors, socioeconomic factors as well as feeding practices \[7,8\].

Mothers’ level of education also plays an important role in the occurrence of malnutrition. In Malaysia, authors have reported a negative relationship between mothers who attained a secondary level of education and the nutritional status of children \[13\], in addition to intellectual capacities, educated mothers receive nutritional education which is useful for adapting nutrition to the children’s needs. Coupled with the amelioration of economic level, this education also helps to further improve the nutritional status of children \[14\]. It all begins with breastfeeding from birth which has numerous benefits \[15\], even in an HIV context \[16\]. Meanwhile, there is lots of prejudice surrounding this \[17\]. Weaning conditions equally impede the application of feeding norms recommended by the WHO \[18\]. Inappropriate feeding in the first 6 months of life consequently causes an alteration in the nutritional status at the age of 12 months \[19\]. According to the findings of this study, about half the patients (49.5%) were breastfed and the breastfeeding was carried out over 6 months in most of them (80.7%).

The taking of ARVs by mothers was not investigated, although the mode of feeding was not conformed to the A option of the prevention of mother-to-child transmission (PMTCT) \[20\] in place at the time of the study. We observed that amongst the subjects that were breastfed, or who received mixed feeding, or those who were not breastfed, malnutrition occurred in 16.7%, 26.3% and 19.5% respectively. The WHO recommends an increase in energy intake of 10% in asymptomatic children infected with HIV \[21\]. In African regions as in other regions, traditional practices and traditional diet restrictions contributes to the occurrence of malnutrition. A lot of taboos limit children’s access to certain foods of animal origin; for example the prohibition of egg consumption \[7\]. In this present study, not only were the number of meals required with respect to age not respected, some patients were restricted certain foods by their mothers. This practice has been described by other authors \[22\].

Knowledge of mothers is crucial in the implementation of nutritional activities. Actually, there exists an association between level of education and knowledge of mothers\[23\]. Education of the woman is therefore an indicator of level of comprehension. Children of more educated mothers; that is those who attained a secondary level of education had a lesser risk of developing malnutrition \[24-26\]. Educated mothers usually break ties with tradition and dietary restrictions. They would be more inclined to exploit received information in order to make better use of available food stuffs. From our results, it follows that when mothers were well informed on malnutrition, complementary feeding was balanced and also implemented at the right time. Meanwhile, not all were counseled to this effect. In as much as they had contact with health facilities, they missed some counselling sessions \[25\]. Some mothers practiced mixed feeding which is strictly advised against in the prevention of HIV transmission. Actually, in certain studies, authors have brought out that recommendations were incompatible with local norms \[26,27\].

Poverty of the woman is one the obstacles to children having access to care \[28-33\]. They being involved in revenue generating activities contribute to well being of the family and the nutritional well being of the children \[17\]. It is for this reason that the IDDS is used to express the economic aptitude of homes to get access to food, especially proteins of animal origin which can improve IDDS \[34\]. In our study, the mother’s revenue influenced nutritional status of children. Patients whose mothers/guardians gain lower than 25000 francs CFA were more exposed to malnutrition. On the contrary, mothers’ occupation could negatively influence the occurrence of malnutrition in children \[35\]; less time to be allocated for this \[36-39\].

**CONCLUSION**

Proper feeding would enable the prevention of malnutrition inspire of the inherent risk due to HIV infection. In as much as mothers master the concept of malnutrition, most of them did not diversify the diet of their children living with HIV. The reinforcement of nutritional education in mothers is crucial.

**Contributions of authors**

NF elaborated the draft, NS, LA, TN and DR reread the document. All authors approved the final version of the document.

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