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Evaluation of the Nutritional State of Children and Teenagers Infected by HIV Treated in a University Hospital in Abidjan (Côte d'Ivoire)

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Abstract

Introduction: The aim of our study was to evaluate the nutritional status of HIV-infected children followed at a university pediatrics department in Abidjan.
Method: This cross-sectional, descriptive and analytical study was conducted from January to March 2013 in the pediatric department of the university teaching hospital of Cocody and concerned pediatrics HIV/AIDS cases. Children of 0-59 months (group A) and those above 59 months (group B) formed two groups.

Results: Two hundred and twenty-two children were assessed during this period. The median age was 105 months and the sex ratio of 1.09. More than half of the children were from modest backgrounds (52.7%) or orphans (53.9%). At enrollment in the cohort, they were mostly symptomatic (77.0%), had immune deficiencies (76.5%), anemia (74,0%) and were on Anti-retrovirals (ARV) therapy (98.1%). The prevalence of malnutrition was higher in group A (46.6%) than in group B (38.4%). Isolated chronic malnutrition was the most frequent clinical form of the two groups (20% and 19.7%). In group A, seven children were suffering of acute malnutrition alone (15.5%) and five children presented with wasting and stunting (11.11%). In Group B, underweight accounted for 10.7% of cases, the underweight and stunting of growth were associated with 8 children (4.5%). The main risk factors for malnutrition were presence of immune deficiency for acute malnutrition (OR=2.80, IC [1.32-5.94.], p<0.01) and chronic malnutrion (OR=3.13, IC [1.62-6.04.], p=0.00) and delayed start of ARV treatment for chronic malnutrition (OR=0.47, IC [0.25-0.88], p=0.01).

Conclusion: Due to delayed diagnoses of HIV in children; chronic malnutrition remains common among them, whatever their age. The activities of nutritional care and support are essential in the management of this infection.

Keywords: Nutritional status; Child; HIV/AIDS; Abidjan

Introduction

The malnutrition of children remains a major public health concern in developing countries. It is both the cause and consequence of poverty. Malnutrition is held for the death of more than a third of the children aged less than five years worldwide [1]. Malnutrition can present as acute malnutrition with wasting, as chronic malnutrition with stunted growth or in the case of over nutrition, as overweight and obesity [2]. The anthropometric indicators weight-for-height and height-for-age allow to evaluate these two types of malnutrition by using a z score or the percentile in relationship with the median of the referred population. The International Pediatric Association officially recommended the use of WHO's standards which it describes as "an effective tool to detect both malnutrition and overweight" [2].

In sub-Saharan Africa, and especially in areas with a high prevalence of HIV child malnutrition remains a major concern. Côte d'Ivoire is the country the most hit by the HIV/AIDS pandemic in West Africa with an estimated seroprevalence of 3.4% in the general population and of 4.5% in pregnant women in 2011[3]. Of the estimated 50000 children living with HIV with only 15% of them are under ARV treatment [3]. Côte d'Ivoire also is challenged by high malnutrition rates, with 5.4% of its children being estimated to be suffering of acute malnutrition [4]. Stunting is the most common form of malnutrition, especially in the children below the age of five who in the northern parts of the country are affected in up to 40% [4].

HIV and malnutrition are intertwined [5]. Indeed, both compromise the immune system. HIV compromises the nutritional status and rise the probability of opportunist infections while malnutrition exacerbate the HIV's effects by further weakening the organism's immune system [5].

Materials and Methods

Study setting

The study was conducted at the HIV unit of the paediatric service of the universityhospital of Cocody in Abidjan, Côte d'Ivoire. Since November 2005, this unit is the national reference centre for the care of HIV infected paediatric patients in Côte d'Ivoire. A multidisciplinary team provides medical care and support. Since June 2011, nutritional assistance and rehabilitation is available with therapeutic milks (F75 and F100) and ready-to-use therapeutic foods (RUTF)

Study participants and data collection

This cross-sectional study concerned all sero-positive children in the cohort aged 0 to 19 years admitted to the HIV-unit as out and in-patients from January to March 2013. They benefited from a systematic evaluation of their nutritional state and if indicated nutritional therapy. The following anthropometric parameters were measured: the weight in kg taken with an electronic scale with a 50g interval, the size in cm measured lying down for children younger than two years old and standing upright for older ones with a statiometer.

In order to evaluate the nutritional state appropriately, the studied population was divided in two groups. Young children aged 0 and 59 months formed group A, and children older than 59 months formed group B. The anthropometric indicators used were the height-for-age (H/A) for both groups, weight-for-height (W/H) for group A and the body mass index-for-age (BMI/A) for group B. The W/H and BMI/A indicators were used to evaluate acute malnutrition (AM) and the H/A to determine the presence of chronic malnutrition (CM). These indicators were compared to the new WHO growth standards [6]. All the children with a z score below -2 were considered malnourished.

The data were collected with the medical folder and a survey with epidemiological parameters (age, sex, nationality, place of living, viral status of parents, socioeconomic conditions and serology status of parents), clinical (DG classification at recruitment), biological (type of HIV, lymphocytic count and blood cell count before an under the study), therapeutic (antiretroviral regime, cotrimoxazole).

- The socio-economic conditions of the parents were assessed by calculating the daily average economic. The formula used was: resource - cost/divided by 30 (number of days in the month)/ divided by the number of homemakers:
  • families whose economic daily average was $1 per day per person were classified as coming from a modest background.
  • families whose economic daily average was over $2 per day per person were classified as resulting from a favorable environment.
  • families whose economic daily average was less than 1 dollar per day per person came from an unfavorable environment.

Data processing

The data entry was performed using Excel 2007. The data were analysed with the soft wares Epi info 6.0 and SPSS 17.0. Non malnourished and malnourished children where compared. Univariate analyse was performed to check for risk factor for acute and chronic malnutrition. The statistic tests used were the khi 2, Fishers exact test and the Odd ratio. The significance level chosen was 5% and the interval confidence was 95%.

Results

During the period of the study, on a population of 232 HIV-positive children in active line, 222 (95,7%) children appeared in our structure.

Childrens characteristics

The average age was 109 months (9.08 years) ranged from 4 months to 19 years. A total of 45 children where younger than five years and 177 were older. Sex distribution was even. The majority of school-age children (95%) were sent to school (80%) and more than half of them werefrom modest socioeconomic backgrounds (52.7%). Many children were orphans with 29.7% having lost their mother and 17.5% having lost their father. The death of both parents was found in 6.7% of the cases. The most frequent mean of contamination was the mother-child transmission (84.3%). At the recruitment, most of the children were symptomatic (category B and C of the CDC classification) (77.02%), showed an immune deficit moderate or severe (76.5%) and an anemia (74.3%). All of them were infected by the HIV1. At the time of the study the majority of the children were under antiretroviral treatment (98%) and under cotrimoxazole (77%). The average duration of treatment was 40 months and more than two third of them had no immune deficitanymore (71.2%). The table 1 presents the children's main characteristics at the recruitment in the cohort.

Children's characteristics	(N=222)	
	Size	**Percentage**
Age (months)		
[0-6]	2	0.90
[7-24]	7	3.15
[25-60]	36	16.21
[61-120]	85	38.28
[121-180]	70	31.53
>180	22	9.90
Sex		
Male	106	47.7
Female	116	52.3
Socio economic conditions		
Favourable	75	33.78
Moderate	117	52.70
Unfavourable	30	13.51
Schooling (n=210)		
Sent to school	168	80
Not sent to school	42	20
Vital status of parents		
Fatherless orphan	46	20.72
Motherless orphan	67	30.18
Serology status of father		

Positive	33	14.86
Negative	69	31.08
Unknown	120	54.05
Serology status of mother		
Positive	187	84.23
Negative	3	1.35
Unknown	32	14.41
Clinical stade (CS)		
N	17	7.65
A	34	15.31
B	77	34.68
C	94	42.34
Immune deficit		
Moderate	75	33.78
Severe	95	42.79
Anemia		
Yes	165	74.32

No	57	25.67
Antiretroviral treatment		
Yes	217	97.74
No	5	2.26
Cotrimoxazole		
Yes	195	87.83
No	27	12.16

Table 1: Characteristics of seropositive children at the recruitment in the cohort.

Evaluation of the nutritional state

In the overall population, the prevalence of AM was 37.3% with 17.5% of acute cases and 25.5% of chronic forms. Malnutrition was more prevalent in the young, (group A 46.6%) than in the older children (group B 38.4%). In-group A, seven children were emaciated (15.5%), nine of them showed signs of chronic malnutrition (20%). Only five children were emaciated and showed chronic malnutrition at the same time (11.11%). In group B, acute malnutrition represented 10.7% and 19.7 % were stunted. Underweight and stunting were associated in 8 children (4.5%). Figure 1 shows the children's layout of nutritional status during the period of the study.
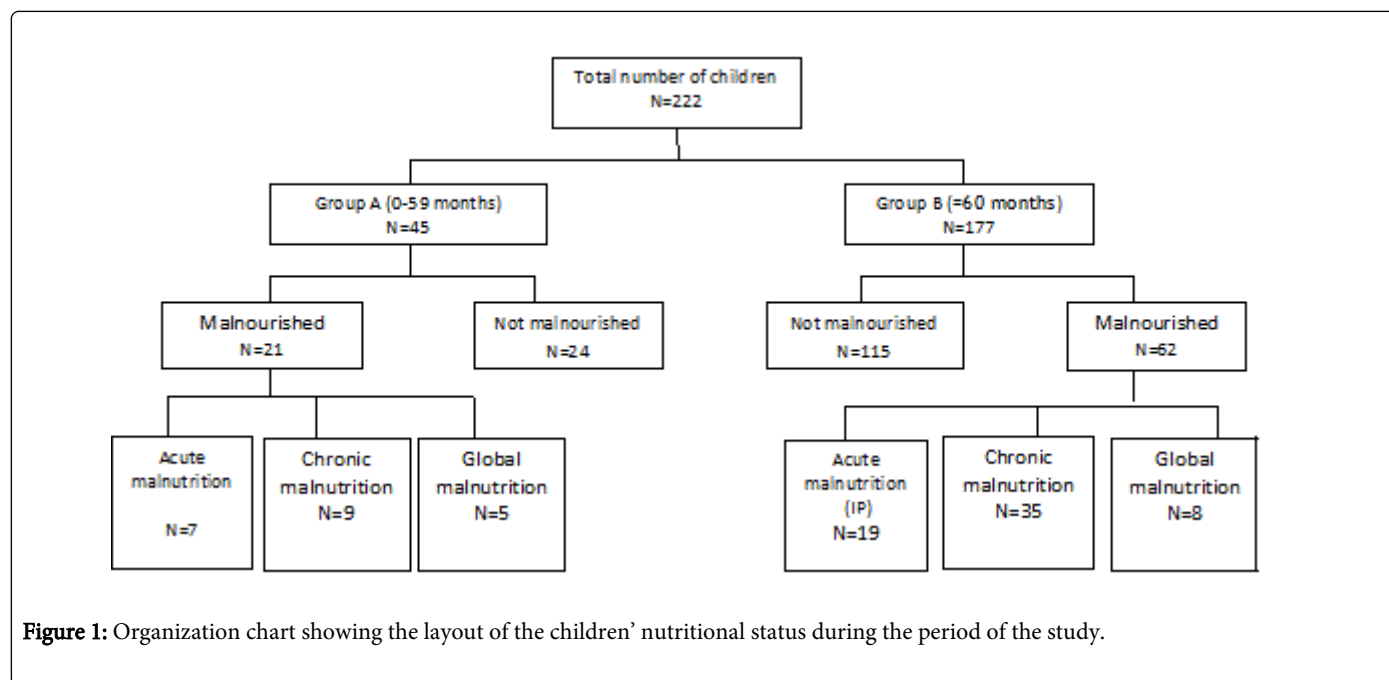

Figure 1: Organization chart showing the layout of the children' nutritional status during the period of the study.

The analytical study concerned the risk factors of malnutrition.

The results of this analysis are listed in Tables 2 and 3.

	Nutritional state (N=178)						
	AM (n=39)		No AM (n=139)		P	OR	[CI]
	Size	%	Size	%			

Age							
0-59 months	11	28.2	22	15.8	0.79	0.47	[0.20-1.10]
≥ 60 months	28	71.8	117	84.2			
SC*							
unfavourable							
Yes	6	15.3	16	11.5	0.51	1.39	[0.50-3.85]

	Size	%	Size	%	P	OR	[CI]
No	33	84.7	123	88.5			
Mother deceased							
Yes	10	25.6	41	29.5	0.63	1.76	[0.32-1.77]
No	29	74.4	98	70.5			
DG B+C**							
Yes	30	76.9	103	74.1	0.72	1.21	[0.50-2.68]
No	9	23.1	36	25.9			
Immune deficit***							
Yes	17	43.6	30	21.5	0	2.8	[1.32-5.94]
No	19	48.7	56	40.2	0.34	1.40	[0.69-2.87]
No	20	51.3	83	59.3			
Duration of treatment							
<36 months	17	43.6	47	33.8	0.26	0.66	[0.32-1.36]
≥ 36 months	22	56.4	92	66.2			

*Socioeconomic conditions, **Symptomatic children, ***At the time of the inquiry

Table 2: Risk factors of acute malnutrition (AM).

Current immune deficit was a risk factor for acute and chronic malnutrition. Symptomatic state and less than 3 years of treatment were risk factors for chronic malnutrition.

Discussion

Despite important progress made in the fight against the HIV/AIDS, diagnosis and treatment of the children infected by the HIV is still often delayed in countries with limited resources. This late diagnosis is also reflected in our figures with average age being 109 months. Mohd [7] in Malaysia and Souza [8] in Brazil described comparable average ages (8.4 years and 9.83 years).

	Nutritional state (N=196)						
	CM (n=57)		No CM (n=139)		P	OR	[CI]
	Size	%	Size	%			
Age							
0-59 months	12	21.1	24	17.2	0.53	0.78	[0.36-1.69]
≥ 60 months	45	78.9	115	82.8			
SC* unfavourable							
Yes	6	15.3	16	11.5	0.51	1.39	[0.50-3.85]
No	33	84.7	123	88.5			
Mother deceased							
Yes	20	35.1	42	30.2	0.50	0.80	[0.41-1.54]
No	37	64.9	98	69.8			
DG B+C**							
Yes	48	84.2	103	74.1	0.12	1.B0	[0.83-4.17]
No	9	15.8	36	25.9			
Immune deficit**							
Yes	27	47.3	31	22.3	0.00	3.13	[1.62-6.04]
No	30	52.6	108	77.7			
Anemia***							
Yes	24	42.1	56	40.2	0.81	1.07	[0.57-2.01]
No	33	57.9	83	59.8			
Duration of treatment							
<36 months	30	52.6	48	34.5	0.01	0.47	[0.25-0.88]

≥ 36 months	27	47.3	91	65.5			
*Socioeconomic conditions, **Symptomatic children, ***At the time of the inquiry							

Table 3: Risk factors of chronic malnutrition (CM).

Upon recruitment, most of the children were symptomatic (77.02%) and almost half of them presented a severe immunizing deficit (42.79%). In the work of Chouldhary in India [9], the stage C represented 40%. Other authors like DIACK in Senegal [10] and Kariyo [11] in Burundi reported respectively in their series 57.14% and 84% of severe deficit.

Mother-to-child transmission of HIV constituted the source of infection (84.23%). Despite setting up multiple PMTCT sites in several health centers, efforts are still insufficient. Strategies like the screening counseling initiated by the service provider (CDIP) still needs to be organized in all sanitary structures. The CDIP will allow an earlier detection and better coverage of children infected with HIV.

The systematic nutritional evaluation of the children in our study demonstrates that prevalence of the acute malnutrition was 17.5% and that more than a quarter of the children presented a chronic malnutrition (25.6%). Our results get closer to those of Sunguya [12] in Tanzania who found 13.6% of acute malnutrition and 36.6% of chronic malnutrition. Nalwoga [13] in Uganda reported higher proportions on the other hand (52% and 68%).

The prevalence and type of malnutrition in our study population varied with age. The children aged less than five years infected by the HIV constitute the group with the higher risk for malnutrition. Our study showed that prevalence of the malnutrition was highest in this age bracket (46.6% any form of malnutrition) with 11.1% suffering from global malnutrition. Stunting was the most frequently met clinical form of malnutrition in both groups (20% and 19.7%); these rates are similar to those found by Kimani-Murage in South Africa (18%). [14] In children aged more than 5 years, nineteen (10.7%) children were wasted. Higher prevalence of chronic malnutrition were reported by Chouldhary (42% for children ≤ 5 years of age and 40% for children>5 years of age) [9].

Malnutrition is frequent in children affected by HIV, despite anti-retroviral treatment [12,13,14]. At the time of our study, the majority of children did no longer present with immune-deficiency (71.2 %). Naidoo in South Africa [15], found that malnutrition did not seem to influence the treatment response in terms of cell-counts and viral load.

The clinical stage moved to the recruitment. The immunosuppression and the delay in the treatment were the risk factors associated tochronic malnutrition. Indeed, Choudhary [7] in his works concluded that early diagnosis and initiation of antiretroviral premature treatment of the children improved anthropometric parameters. However, Sunguya [12] suggest the systematic administration of. RUFT on the children under treatment reduced in a considerable way the arisen of malnutrition.

Conclusion

Our study shows that more than one third of children infected with HIV are malnourished. We demonstrate the need for early diagnostics and an holistic care approach including not only early treatment but also monitoring of antropomethric parameters and nutrition.

Additional interventions as the nutritional support remain indispensable and will possibly allow to help retain more children in the care program, but also to allow them to optimal growth and a better quality of life [16].

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