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Protein-energy Malnutrition and Human Immunodeficiency Virus Infection in Children in Jos

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Sixty-one consecutive children aged four - 54 months (mean, 12.98 months) with protein-energy malnutrition (PEM) and 60 well nourished controls aged five - 60 months (mean, 17.5 months) admitted to the Jos University Teaching Hospital between January and October 1997, were screened for HIV infection by the ELISA and Western Blot methods. Twenty-three (37.7 percent) of the 61 children with PEM tested positive for HIV 1 by both methods while none of the controls tested positive ($P<0.0001$). These results indicate a high prevalence of HIV infection among children with PEM and suggest that HIV infection is becoming a significant cause of PEM among children in our environment. Alhtough it would be ideal to carry out routine HIV screening in all children with PEM, the ethical and social implications of such a policy need to be carefully considered in view of the non-availability of an effective cure and the inadequacy of social support systems.

Introduction

PROTEIN-energy malnutrition (PEM) is prevalent in Nigeria and is a significant cause of morbidity and mortality among children.[1-3] Previous hospital based studies from various parts of the country have reported the prevalences of PEM as being between 4.4% and 11.6%.[2,3] However, a National Demographic and Health Survey (NDHS)[4] in 1990, revealed that 43% of children under the age of five years in Nigeria suffered from stunting. HIV infection is becoming a significant cause of morbidity and mortality among children in our environment.[4-6] Malnutrition may be one of the clinical presentations of childhood AIDS.[7-9] Previous studies have reported the prevalence of HIV infection among children with PEM to vary between 3% and 45%.[9-11] Despite the growing magnitude of the HIV infection in our environment and the high prevalence of PEM, the contribution of HIV infection to the increasing incidence of PEM remains largely unknown. The present prospective study was therefore, undertaken in order to determine the prevalence of HIV infection among a group of children admitted with PEM to the Jos University Teaching Hospital (JUTH).

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Subjects and Methods

The subjects consisted of children admitted to the paediatric wards of JUTH between January and October 1997, with the diagnosis of severe PEM. The classification of PEM was based on the modified Wellcome classification.[1,2] Severe PEM refers to children with kwashiorkor, underweight-kwashiorkor, marasmic kwashiorkor or marasmus. The controls consisted of well nourished children admitted into the paediatric wards for other medical problems. Pre-sampling counselling was carried out on all the mothers by one of the authors (IAA) and only the children of mothers who gave verbal consent to participate in the study were recruited.

Following physical examination which included anthropometric measurements of weight, length, occipito-frontal circumference (OFC), and mid upper arm circumference (MUAC), about 5ml of venous blood was obtained from each patient and centrifuged; the sera were kept at -20°C until they were tested for HIV I and II by ELISA at the Immunology Laboratory of JUTH, making use of commercial test kits (Immunocomb from Organics, Israel). Confirmatory test was carried out using the Western Blot (WB) method in cases where sera samples were reactive on repeat ELISA test (double ELISA positive). Western Blot tests were carried out at the Plateau Hospital, Jos, a national AIDS surveillance and confirmatory centre supported by

the ICSC World Laboratories (Lausanne, Switzerland). Results of WB tests were interpreted using the criteria recommended by the Centres for Disease Control (CDC), Atlanta, [13] as follows: negative when no bands were present; reactive (positive) when antibodies (Abs) were detected against any two of the following antigens: p24, gp41,gp 120,gp 160. For statistical analysis, the chi-square test was applied as appropriate.

Results

Of the 89 consecutive children admitted with severe PEM during the study period, consent to participate in the study was obtained in respect of only 61 aged 4-54 months (mean 12.98± 9.9 months). Three (4.9 percent) of the 61 children had kwashiorkor, five (8.2 percent) had underweight - kwashiorkor, 20 (32.8 percent) had marasmic - kwashiorkor while 33 (54.1 percent) had marasmus. There were 38 males and 23 females, (M:F ratio, 1.7:1). Sixty well nourished children (34 males and 26 females; M:F=1.3:1) aged five-sixty months (mean 17.5± 12.1 months) served as controls. Table I shows the anthopometric data of the children with severe PEM and controls. All the anthropometric values of the children with severe PEM were significantly lower than those of the controls (P<0.05).

Table I

Anthropometry of Children with Severe Protein-energy Malnutrition (PEM) and Controls

	PEM		*Controls*		
Parameter	*Mean*	*SD*	*Mean*	*SD*	*P value*
Age (mo)	12.98	9.90	17.50	12.10	<0.05
Weight (kg)	6.28	1.60	10.89	4.66	<0.001
Length (cm)	69.88	8.99	73.77	9.70	<0.05
OFC (cm)	43.99	2.78	46.60	7.84	<0.02
MUAC (cm)	10.39	1.52	15.63	2.16	<0.001

OFC = Occipitofrontal circumference
MUAC = Mid-upper arm circumference

Table II

HIV Status of Children with Severe PEM and Controls by ELISA and Western Blot

	Number of cases			*Number*	*% Positive*	*P value*
Group	M	F	Total	*Positive*		
Severe PEM	38	23	61	23	37.7	<0.0001
Controls	34	26	60	0	0.0	

Table II shows the results of the HIV status of the children with severe PEM and controls by both double ELISA and WB. Twenty-three (37.7 percent) of the 61 children with severe PEM tested positive for HIV I by both double ELISA and WB; conversely, none of the 61 controls tested positive (P<0.0001). Thirty-seven of the 61 mothers of the children with severe PEM who gave consent to screen their children also agreed to have their own sera tested, out of which eight (21.6 percent) tested positive by both double ELISA and WB. All the children of these eight mothers also tested positive.

Table III

Associated Conditions in 61 Children with Severe Protein-energy Malnutrition (PEM)

	HIV Status					
	Positive (n=23)		*Negative (n=38)*			
Condition	*No of Cases*	*%*	*No of Cases*	*%*	*Total No of Cases*	*Percent of Total*
Diarrhoea	17	73.9	26	68.4	43	73.5
Oral Candidiasis	13	56.5	19	50.0	32	52.5
Pneumonia	9	39.1	13	34.2	22	36.1
Otitis media	7	30.4	9	23.7	16	26.2
Tuberculosis	5	21.7	7	18.4	12	19.7
Urinary tract infection	3	13.0	2	5.3	5	8.2
Skin and soft tissue Infection	2	8.7	3	7.9	5	8.2

Table III shows the associated conditions in the 61 children with severe PEM (both HIV positive and negative). The commonest associated conditions were diarrhoea, oral candidiasis and pneumonia, which occurred in 70.5 percent, 52.5 percent and 36.1 percent respectively. Although these conditions occurred more frequently in the group of children with severe PEM who were HIV positive compared with those who were HIV negative, this was not statistically significant (P>0.05).

Discussion

The present study which shows a very high prevalence of 37.7 percent of HIV infection among children with PEM, indicates that HIV infection might be increasing at an alarming rate in our environment. Thus the prevalence obtained among the children in the present study is much higher than the 3 percent reported among malnourished children from Ogbomoso in south-western Nigeria by Fischer *et al*[9] in 1990. The prevalence in the present study is however, less than that of 45 percent reported in 1987 by Musey *et al*[10] among malnourished children in Burundi. Previous studies have shown that majority of children with HIV infection in this environment present with wasting, [5,6] which is also one of the three major criteria for the clinical diagnosis of paediatric AIDS in Africa as proposed by WHO.[8] Although PEM can result from several other causes, the high prevalence of HIV infection among children with PEM compared with controls obtained in the present study would suggest that HIV infection is becoming an important cause of PEM among children. Factors which may contribute to malnutrition in HIV infected children, include reduced oral intake and gastrointestinal disorders such as chronic diarrhoea, malabsorption and gastrointestinal bleeding, resulting from infectious, neoplastic or non-specific ("HIV enteropathy") causes.[14]

The high prevalence of HIV infection obtained among children in the present study probably reflects a high prevalence of HIV infection among women of reproductive age in our environment. It has been previously shown that through the detection of children with AIDS, previously unsuspected HIV positive parents could be discovered;[6] this was indeed the case in the present study, as all the eight mothers who were HIV positive were asymptomatic and only discovered because of the symptomatic children. All the mothers of the children in the present study were married and it is possible that they acquired the infection either through their infected husbands or extra-maritally. Thus, as previously suggested, the concept of some well defined "high risk groups" in our environment should be discarded since all groups are indeed "high risk groups".[10] It is only individual sexual behaviour that largely determines the risk of infection. Although the diagnosis of Paediatric AIDS below the age of 12 months remains problematic because of passively transferred maternal antibodies,[7] PEM in the absence of any other known cause, and in the presence of positive HIV antibodies should strongly support the diagnosis of AIDS. Moreover, the mean age of 12 months in the children with PEM in the present study suggests true HIV infection, rather than passively transferred maternal antibodies.[7] In the present study, only sera samples that were positive by repeat ELISA were further subjected to WB test. Negative ELISA samples were considered HIV negative. However, previous studies by Fischer *et al*[9] among malnourished children had found a high prevalence of sera samples that were negative by ELISA but were either reactive or indeterminate by WB test and suggested that the WB test may be less reliable than ELISA in the diagnosis of HIV infection in Africa. The reason for this remains unclear.

Routine HIV screening has previously been advocated for children presenting with PEM in our environment and the findings of the present study would support such earlier recommendations.[6] Although it would be ideal to carry out routine HIV screening in all children with PEM, the ethical and social implications of such a policy need to be carefully considered in view of the inadequacy of social support systems in our environment. Patients with HIV infection in our environment are still subjected to discrimination and carry a lot of stigma. Furthermore, there is at present, no effective treatment as anti-retroviral drugs currently in use elsewhere are either not available or beyond the reach of most people in our environment. Children with PEM and their parents who may be HIV infected therefore need to be counselled, educated and offered the option of screening. Establishment of HIV counselling services, where such do not exist, in each screening centre, for pre and post-sampling counselling and follow up of infected patients is

therefore, strongly advocated. In view of the increasing incidence of HIV infection in our environment. AIDS awareness programmes and preventive measures need to be vigorously intensified and sustained.

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