Body Mass Index: a Prognosis Factor Among HIV Seropositive Malnourished Children

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Summary

In both adults and children, weight loss is one of the major complications of HIV infection and constitutes a factor of bad prognosis. Among children, anthropometry constitutes the most convenient method for assessing nutritional status and the aim of this study was to assess the prognosis value of various anthropometric indicators among seropositive malnourished children.

This retrospective analysis was conducted on 101 children suffering from marasmus, monitored in 1994 at an infant home in Cote d'Ivoire. The percentage of seropositive children was 51 per cent and the mortality rate was significantly higher in this group (23 deaths out of 52 (44 per cent) for seropositive children, and five deaths out of 49 (10 per cent) for seronegative ones; \( P < 0.001 \)). Among the anthropometric indicators studied, only the body mass index (BMI) could be significantly related to the vital prognosis among seropositive children (deceased: \( \text{BMI} = 10.5 \pm 1.1 \text{kg/m}^2 \); living: \( \text{BMI} = 11.3 \pm 1.2 \text{kg/m}^2 \); \( P < 0.05 \)).

Determining this index in seropositive malnourished children could constitute an objective and quick method for assessing the prognosis in these children.

Introduction

Many studies have demonstrated the considerable impact of malnutrition on infant mortality in third world countries. Among the various indicators used to assess the nutritional status, the weight-for-age and the brachial perimeter are the most accurate indicators for assessing the risk of death among children. Besides, as suggested by a recent study, the body mass index may also be of good prognosis value in severely malnourished children.

Weight loss in both adults and children is the most frequent complication observed during HIV infection, and the nutritional status has also been closely related to the vital prognosis among seropositive patients. Most of these studies were conducted in industrialized countries, and no studies exist on this subject on children in Africa.

The aim of this study, therefore, was to assess if the body mass index, which is quite easy to calculate, could serve as a prognosis factor in seropositive malnourished children in Cote d'Ivoire.

Patients and Methods

The OASIS centre, situated in the municipality of Koumassi, was established at the end of 1993. The aim of the centre, which is run by Mother Theresa's charity missionaries, is to give relief to the most under-privileged families and especially AIDS patients. In addition to caring for seropositive adults, the centre also has a nursery which receives the locality’s malnourished children. During their stay at the centre, the children receive medical care twice a week and are fed with locally produced foodstuffs.

This retrospective study covers cases of children monitored at the centre in 1994. Anthropometric measures were taken by the same examiner upon the children's arrival at the centre. All the data gathered have been coded on a micro-computer and analysed using statistics software (Epi Info and Anthro). The anthropometric indicators (weight-for-age, weight-for-height and height-for-age) were calculated according to NCHS references and are expressed in Z-scores. The body mass index corresponds to the following formula: \( \text{BMI (kg/m}^2) = \text{weight (kg)/[height (m)]}^2 \).

Blood tests were carried out with the family’s consent. The tests were carried out using the ELISA method (Genelavia Mixt, Pasteur, France) and confirmed by a synthetic peptide test (PeptiLAV 1-2, Pasteur, France).

Results

In 1994, blood tests were carried out among 101 children suffering from marasmus (defined by a weight for height < -2 Z-scores). Fifty children (50 per cent) were HIV1 positive and two (2 per cent) were HIV1 and HIV2 positive. Mortality among the seropositive children was significantly higher than that observed in seronegative
TABLE 1
Anthropometric indicators in seropositive children

<table>
<thead>
<tr>
<th></th>
<th>Living (M ± SD)</th>
<th>Children (n)</th>
<th>Deceased (M ± SD)</th>
<th>Children (n)</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (months)</td>
<td>15.2 ± 9.2</td>
<td>(29)</td>
<td>13.6 ± 9.9</td>
<td>(23)</td>
<td>NS</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>5.700 ± 1.690</td>
<td>(29)</td>
<td>4.890 ± 1.420</td>
<td>(23)</td>
<td>NS</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>69.5 ± 10.0</td>
<td>(26)</td>
<td>65.0 ± 9.6</td>
<td>(18)</td>
<td>NS</td>
</tr>
<tr>
<td>Weight/age (Z-scores)</td>
<td>-3.9 ± 0.9</td>
<td>(29)</td>
<td>-4.2 ± 0.8</td>
<td>(23)</td>
<td>NS</td>
</tr>
<tr>
<td>Height/age (Z-scores)</td>
<td>-3.3 ± 0.7</td>
<td>(25)</td>
<td>-3.7 ± 0.9</td>
<td>(17)</td>
<td>NS</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>11.3 ± 1.2</td>
<td>(26)</td>
<td>10.5 ± 1.1</td>
<td>(18)</td>
<td>P &lt; 0.05</td>
</tr>
</tbody>
</table>

BMI: Body Mass Index; NS: not significant.

TABLE 2
Anthropometric indicators in seronegative children

<table>
<thead>
<tr>
<th></th>
<th>Living (M ± SD)</th>
<th>Children (n)</th>
<th>Deceased (M ± SD)</th>
<th>Children (n)</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (months)</td>
<td>15.3 ± 8.2</td>
<td>(44)</td>
<td>24.4 ± 14.7</td>
<td>(5)</td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>5.520 ± 1.610</td>
<td>(44)</td>
<td>5.880 ± 1.280</td>
<td>(5)</td>
<td>NS</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>69.7 ± 9.0</td>
<td>(40)</td>
<td>75.2 ± 5.1</td>
<td>(4)</td>
<td>NS</td>
</tr>
<tr>
<td>Weight/age (Z-scores)</td>
<td>-4.2 ± 1.0</td>
<td>(44)</td>
<td>-4.8 ± 0.8</td>
<td>(5)</td>
<td>NS</td>
</tr>
<tr>
<td>Height/age (Z-scores)</td>
<td>-3.5 ± 0.9</td>
<td>(39)</td>
<td>-4.6 ± 0.2</td>
<td>(4)</td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>10.9 ± 1.3</td>
<td>(40)</td>
<td>9.6 ± 1.0</td>
<td>(4)</td>
<td>NS</td>
</tr>
</tbody>
</table>

BMI: Body Mass Index; NS: not significant.

Discussion

The high percentage of seropositive children admitted to OASIS is mainly due to the mode of recruitment (malnourished children, orphans, seropositive parents, etc.). Nevertheless, this percentage is much higher than the 13 per cent observed in 1988 in Abidjan among malnourished children,10 and may also reflect the growing number of seropositive cases among the adult population. In seronegative malnourished children, the percentage of deaths at the OASIS is comparable to that observed in previous studies.12 The high mortality among seropositive children confirms the observations made in Abidjan among children admitted to hospital.13

In seropositive adults, weight loss mainly occurs at the expense of the lean body mass and this differs from malnutrition caused by protein energy deficiency.14,15 In these patients, the loss of lean body mass is linked to the vital prognosis, while the body mass index does not seem to apply, most likely because part of the fatty mass remains preserved.7 The body mass index could, however, be a factor of morbidity in seropositive adults.16,17

As the body mass index varies with age in children, it was seldom used to assess the nutritional status.18 However, this indicator seems to constitute a good prognosis factor among severely malnourished children.4 In seropositive children, the vital prognosis was...
linked to the drop in the weight-for-age and height-for-age indicators, but the body mass index has not as yet been assessed. In our study, this indicator seems to have the best prognosis value among seropositive malnourished children. The reduction in the body mass index could mean a fall in fatty mass among these children which, coupled with the loss of lean body mass, could constitute a factor for wrong prognosis.

Anthropometry among children represents the most convenient method for assessing the nutritional status and, among the various indicators, the body mass index is the simplest to calculate. Determining this indicator in seropositive malnourished children could constitute an objective and quick method for assessing the vital risk, and should also help in speeding up the process for nutritional care in these children.

References
