AMINO ACID ANALYSIS AND PROTEIN EFFICIENCY RATIO OF POWDERED ALTERNATIVE READY-TO-USE THERAPEUTIC FOODS (ARUTFs) FOR COMMUNITY MANAGEMENT OF SEVERE ACUTE MALNUTRITION

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Introduction

Nearly half of all deaths in children under 5 in Africa are attributable to undernutrition; this puts children at greater risk of dying from common infections, increases the frequency and severity of such infections, and delays recovery [1]. While crops can provide a nutritive source of proteins in the diets of children in developing countries with inadequate source of animal protein like Nigeria, the complete or partial replacement of animal protein particularly in fabricated foods remain a major challenge in combating malnutrition. Of all the potential sources of unconventional food proteins, groundnuts and cowpea rank at the top of the list. Amino acids are building blocks for the body as they make up proteins. Amino Acid Analysis and Protein Efficiency Ratio assay have been used extensively to evaluate the nutritional quality of food proteins. This study was conducted to evaluate the Amino Acid Content compared with Casein and Protein Efficiency Ratio (PER) of ARUTFS as compared with F-75/F-100.

Materials and Mathods

Blend formulations using three formulations of Powdered Groundnut Seed, Millet, Cowpea, Icing Sugar, Vegetable Oil, Egg Yolk and Vitamin/Mineral Premix as prepared by Bioorganics Nigeria Limited (A, B and C) while Groundnut Cake Powder replaced Powdered Groundnut Seed in another three formulations (D, E and F) in different proportions were developed, the Amino Acid profile in the test samples were determined [2]. These samples were then fed to 42 malnourished albino rats (*Rattus norvegius*) grouped into 7 (Group A - G) each kept singly and fed test diets and F75/F100 with distilled water *ad libitum* for 28days; left over was collected every morning, dessicated and weighed. The feed intake and weight were recorded and the PER was calculated and compared with F-75/F-100 as standards [3].

Results and Discussion

Table 1 shows the amino acid profile of the samples. The essential amino acid content for children in samples D, E and F were higher than samples A, B and C. This could be attributed to the high protein content in groundnut cake powder as reported by Ekundayo [4] and it was evident in their PER (I.5 – 2.3), however too high protein is not required by malnourished children as it could overtax their kidney [3]. The result showed that the lysine content will enable the synthesis of carnite which converts fatty acids in groundnut into energy and also plays an important role in the production of enzymes, hormones and antibodies hence increase the ability of SAM children to fight against infections, so also is threonine. The value of histidine could be responsible for growth and general tissue repair as evident in the PER of the samples. The arginine content of ARUTFs were considerably higher than that of casein. The valine content is adequate for muscle metabolism, repair of damaged tissues in SAM and in the treatment of liver

and gall bladder disorders arising from anti – nutrients consumption. The methionine which aids in the production of sulphur is necessary for normal metabolism and also essential for the synthesis of haemoglobin and glutathione that fights against free radicals that might result from the oxidation of the diets, since groundnut contains high level of Unsaturated Fatty Acids. The leucine content of the ARUTFs are in close values with that of casein, these values are nutritionally beneficial as its high levels in foods containing cereals like millet and or sorghum have been implicated in niacin deficiency. The phenylalanine content of the ARUTFs were up to the standard of casein and will help in the regulation of the central and peripheral nervous system. Tryptophan is an essential amino acid, it was however destroyed by 6N HCl during hydrolysis and was therefore not determined. There was significant difference ($P \leq 0.05$) between the PER of the samples with sample E and F having the least value of PER of 1.5, sample A, B and C had 2.3, 2.0 and 1.9 respectively as compared with sample G (F75/F100) with 3.2. ARUTFs prepared from the composition of sample A, B and C by complementing cereal – legume traditional Nigerian diets with vitamin/mineral premix have close Amino Acid Profile and PER to F-75/F-100 and that of casein (PER of 2.5) and therefore can be used for Community Management of Acute Malnutrition.

Table 1 Amino Acid of Alternative Ready-to-use Therapeutic Foods as Compared with Casein in g/100g Protein

Amino Acid	Casein	A	B	C	D	E	F
Lysine	8.2	3.0	2.8	3.2	3.3	3.5	4.2
Histidine	3.1	2.4	2.4	2.3	2.4	2.3	2.9
Threonine	4.9	3.9	3.6	4.2	4.5	4.5	4.6
Valine	7.2	5.2	4.9	5.4	5.5	5.3	6.0
Methionine	2.8	2.2	1.9	2.4	2.6	2.6	2.7
Isoleucine	6.1	4.2	4.0	4.5	4.6	4.6	4.7
Leucine	9.2	9.2	8.7	9.6	9.7	9.7	9.9
Phenylalanine	5.0	4.8	4.7	5.5	5.3	5.3	5.6
Tryptophan	1.2	ND	ND	ND	ND	ND	ND

Casein Values ([5]).
ND – Not Determined.

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