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COMPARATIVE STUDIES OF THE NUTRITIONAL INDICES OF RURAL AND URBAN SCHOOL AGE CHILDREN IN UMUAHIA, NIGERIA

A. O. UJAH and MAISIE H. ETUKUDO

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ABSTRACT

Malnutrition is a major health problem among young children in third World countries. In the present study, a comparative assessment of the nutritional indices of rural and urban school children in Umuahia North Local Government Area of Abia State, Nigeria was undertaken by assessing both anthropometric and biochemical parameters of these children. A total of one hundred and forty three (143) subjects were used for the study .

Seventy one (71) children were from the rural school and seventy two (72) from the urban school with age range of 6-13 years. The anthropometric measurements examined

Included mid –upper -arm circumference , chest circumference , weight and height. Results showed that there were no significant differences in the anthropometric measurements ($p > 0.05$) between the two groups studied. The biochemical parameters assayed were total cholesterol, total proteins, albumin and globulin. There were also no significant differences in the biochemical parameters assayed when the two groups were compared. These findings probably suggest that malnutrition between the age range of 6-13 years is rare among primary school children in rural and urban Umuahia.

KeyWords: Malnutrition, Anthropometric measurements, biochemical indices.

INTRODUCTION

Nutrition is the sum total of the processes by which the living organism receives and utilizes nutrients, the materials necessary for survival, growth and repair of worn-out tissues (Roper,1978), in the body, with energy to perform its essential functions and the substances it needs for its growth , nutrients, the body with energy to perform its essential functions (Cheesbrough,1987). When nutrition is defective or inadequate ,there is stunted growth , delayed puberty , susceptibility to disease and underdevelopment of motor functions (Winkins , 1977). Good nutrition is the basis for optimal health and survival (Winkins,1977) . When one or more specific macro- and micro-nutrients are inadequately taken this results in malnutrition (Wilson,1985). Malnutrition can also be caused by faulty feeding practices ,unnecessary starvation, poor hygienic and socio-economic reasons, family instability, illiteracy and large family size among other causes (Waldmann, 1986; Ighogbaja and Okuonghae, 1993).

Malnutrition increases susceptibility to infections, results in pathological conditions like kwashiorkor, marasmus (McMurray et al, 1981, Chandra, 1983). Anaemia of varying degrees was reported in malnourished children (Nkrumah et. al., 1988). Over half of the malnourished children that die betray few or no outward signs of malnutrition at all (Bellany, 1988).

Clinical manifestation of malnutrition in children especially latent malnutrition are such that

A. O. UJAH, Department of Chemical Pathology, College of Medical Sciences, University of Calabar, Calabar - Nigeria
MAISIE H. ETUKUDO, Dept. of Chemical Pathology, College of Medical Sciences, University of Calabar, Calabar - Nigeria

diagnosis based on clinical symptoms and signs are not enough. Hence the biochemical and anthropometric measurements make the diagnosis more specific and accurate. The biochemical measurements most commonly used are total proteins, albumin, globulins and cholesterol. Others are pre-albumin and transferrin. The use of anthropometric measurements especially weight and height to represent childhood nutritional status is largely related to the assessment of protein energy deficiency. Height and other measures of frame size may be particularly useful in epidemiological studies because they reflect an influence of diet in the remote past that may be difficult to measure in any other way (Willet, 1990).

During infancy and childhood, reduction of height between four to six inches before adolescence has been reported as one of the effects of malnutrition (Winkins, 1977). Malnutrition especially during gestation and the first two to three years of life retards the rate of increase in head circumference resulting in reduced cranial volumes and reduced intelligence (Stoc[illegible] and Smyth, 1963).

Few reports (Onuminya, (1998)'s Outcome of special nutrition education in the treatment of protein energy malnutrition, Brailey, (1992)'s Priority programe for elimination of malnutrition from Africa) have come from Nigeria and for his reason, this study has been designed to establish.

The nutritional indices among rural and urban school children in Umuhia North Local Government Area of Abia State, Nigeria. To see if location has a role to play on nutritional parameters of these children.

MATERIAL S AND METHODS

One hundred and forty three (143) school children between 6 –13years of age formed the subjects for this study. They were categorized as follows – rural school children (71) and urban school children 72. Five millitres (5 mls) of blood was collected from each subject for the estimation of the biochemical parameters (total protein, albumin, globulins and cholesterol). They were spun at 3,000 r. p. m for five minutes and the plasma obtained was used for the analyses. Samples were deep frozen in ice-packed containers and transported as such to UCTH Calabar, Cross River State, Nigeria, where the analyses were done.

Total proteins were measured using the Biuret method where peptide bonds in proteins react with the Biuret reagent to give a violet colour whose intensity is proportional to the protein content of the sample (Cornal et al., 1953). Albumin was measured using the bromo-cresol green (BCG) method where the dye binds albumin to form an albumin dye complex (Doumas, et al, 1971). Cholesterol was estimated by Bowman and Wole (1962) method which is a modification of Zak reaction. The anthropometric measurements were done using the Vaughan and Litt (1987) method Student "t" test was used to anlyze the data obtained.

RESULTS

For the anthropometric measurements, the mean age of the children was as follows – 9.6 ± 1.9 years and 9.8 ± 1.9 years for the rural and urban children respectively. There was no significant change in age ($P > 0.05$) between rural and urban children. The difference in weight between the rural and urban children was not significant ($P > 0.05$) with mean of 27.1 ± 5.0 kg and 26.7 ± 5.4kg respectively. The mean height between the two groups of children showed no significant difference ($P > 0.05$). The mean head circumference of the rural children when compared with that from urban did not show any significant difference ($P > 0.05$). the chest circumference and mid upper arm circumference also did not show any significant differences when the rural children were compared with the urban children ($P > 0.05$). The anthropometric and biochemical parameters of rural and urban school children are summarized in Tables 1 and 2 respectively.

The total protein levels in both the rural and urban children were not significantly different when they were compared using student's 't' test ($P > 0.05$). The albumin levels were not significant. The mean globulin level for the two populations

TABLE I ANTHROPOMETRIC PARAMETERS OF RURAL AND UBAN SCHOOL CHILDREN

	RURAL n = 71	URBAN n = 72	t - VALUE	COMMENT
Age (years) Mean ± S.D Range	9.6 ± 1.9 5.9 – 13.3	9.8 ± 1.9 6.1 – 13.5	0.331	>0.05 not significant
Weight (kg) Mean ± S.D. Range	27.1 ± 5.9 15.5 – 38.7	26.7 ± 5.4 16.1 – 37.3	0.42	>0.05 not significant
Height (M) Mean ± S.D. Range	1.3 ± 0.1 1.1 – 1.5	1.3 ± 0.1 1.1 – 1.5	0.06	>0.05 not significant
Head circumference (cm) Mean ± S.D. Range	51 ± 1.7 47.9 – 54.3	50.7 ± 1.5 47.8 – 53.6	1.12	>0.05 not significant
Chest circumference (cm) Mean ± S.D. Range	62.0 ± 5.1 52.0 – 62.0	62.2 ± 4.9 52.6 – 71.8	0.20	>0.05 not significant
Mid-upper arm Circumference (cm) Mean ± S.D. Range	18.2 ± 1.7 14.9 – 22.7	18.8 ± 2.0 14.9 – 22.7	-1.93	>0.05 not significant

n = No of Subjects studied.
Results are expressed as mean ± standard deviation

were 29.0 ± 11.4g/l and 31.2 ± 4.1g/l for the rural and urban children respectively and when compared did not show any statistical difference ($P > 0.05$). The cholesterol values when tested were not significantly different ($P > 0.05$).

DISCUSSION

Clinical manifestation of malnutrition in children especially, latent malnutrition are such that diagnosis based on clinical signs and symptoms are not enough. Hence the biochemical and anthropometric measurements make the diagnosis more specific and accurate (Burman, 1976). The anthropometric and biochemical measurements were used to assess the nutritional indices of school children especially as latest malnutrition may likely be present (Burman, 1979). Suskind et al. (1990) noted that 40% of the world's pre-school children and school children suffer from malnutrition while Bellamy (1998), observed that over half of the malnourished children that die betray few or no outward signs, at all. Waldman (1986), stated that among other things socio – economic reasons (poverty) are major factors which cause malnutrition. Ighogbaja and Okuongae (1993), observed that instability of family, illiteracy, ignorance and large family size, all of which are attributes of lower socio – economic class are also causes of malnutrition in the middle belt of Nigeria. Classical protein energy malnutrition has been described as the disease of the lower socio – economic class (Coulter et al, 1988).

In Zambia, 70% of child death are directly or indirectly a result of malnutrition (Syatilimi, 1988). Egbulem, (1992), repoted that mainutrition, is on the ascendancy in the West African Coast. He based his report on the data collected from admission in various hospitals. The biochemical and anthropometric measurements are the first to respond to and become affected by nutritional deficiency (Burman, 1979).

The body weight, serum albumin and heamatological parameters (total lymphocytes) are therefore used as prognostic values in the assessment of nutritional status (Taylor, 1991). Height and Weight of children (growth performance) in different populations depend on the nutritional status in the community (Verma, et al, 1980), it also depends upon their gene pool, their environment, and their rate of maturation (Burman, 1979, Verma et al, 1980). The rate of growth through chidhood is very similar throughout the whole world, although at puberty there are differences in the rate of maturation (Burman, 1979).

In the present study, anthropometric measurements showed no significant difference ($P>0.05$) between the two groups studied and the values compared favourably wellcome standard (Hendrickse, 1991). This suggests that the achievement of growth from remote past (as measured by height, head circumference) up to date (as measured by mid – upper – arm circumference, skin fold thickness and weight – for height in both groups of children was satisfactory. Johnson et al. (1980) obtained similar for Benin City children when they reported a gradual increase of nutritional parameters (nutritional status) from four (4) year and above.

The mean albumin level in the two groups were also not statistically significant ($P>0.05$). Albumin synthesis depends on the amino acid intake and its deficiency produces retardation of growth and under – development of the intellect which in most cases causes major difficulties in learning and behaviour (Muralt, 1972). In the present study, the amino acid intake (obtained from

TABLE II: BIOCHEMICAL PARAMETERS OF RURAL AND URBAN SCHOOL CHILDREN

	RURAL n = 71	URBAN n = 72	t-VALUE	COMMENT 'p'
Total Proteins (g/L) Means ± S. D. Range	68.1 ± 13.7 41.2 – 95.0	70.8 ± 15.7 39.3 – 100.7	-1.1	>0.05 not significant
Albumin (g/L) Mean ± S. D. Range	39.5 ± 8.3 23.2 – 55.8	42. 1 ± 11.0 20.5 – 63.7	-0.16	>0.05 not significant
Globulins (g/L) Means ± S. D. Range	29.0 ± 11.4 6.7 – 51.3	31.2 ± 41.1 3.6 – 58.8	-0.03	>0.05 not significant
Chloesterol (mmol/L Mean ± S. D. Range	3.2 ± 0.6 2.0 – 4.4	3.3 ± 0.7 1.9 – 4.7	-1.41	>0.05 not significant
Chest circumference (cm) Means ± S. D. Range	62.0 ± 5.1 52.0 – 62 0	62.2 ± 4.9 52.6 – 71.8	0.24	>0.05 not significant

n = No of Subjects studied.
Results are expressed as mean ± standard deviation

proteinous meals) can be judged as adequate since the albumin values were not affected in both groups of children. This balance in the two groups can be attributed to the fact that school children being more or less independent can fend for themselves especially the rural children, thereby balancing the adverse nutritional impact that the different backgrounds could have created (Verma et al, 1980). These results fall within the normal values of Whitby et al. (1980) who stated that albumin levels > 36.0g/L are taken as normal while values less than 30.0g/l are regarded as being abnormally low and depicts varying degrees of malnutrition. These are also in accordance with Masanganise and Waterson (1983) and Dahlin and Dahlin (1999) who reported that undernutrition, high morbidity and mortality are high among children below five years of age in all developing countries. It should be noted that the age range studied above falls below that in the present study.

The mean globulin levels when compared did not show any difference between the two populations. Increased globulin levels in previous studies especially of children that were not well nourished depicted the presence of infections (Gabig and Babior, 1972, Golden and Ramdath, 1985, Whitehead 1991). In the present study, it could be said that since the globulin was within normal limits, that infections were absent in both groups of children

The rural and urban school children showed no significant differences in their cholesterol values. Total cholesterol assay is significant in nutritional assay as they are used to follow the response to treatment of malnourished patients (Truswell and Hansen, 1967). It is usually observed to be low prior to therapy and rises as recovery occurs. It therefore is a sensitive biochemical index of success or failure of therapy. The result in this study are within the acceptable limits given by Whitby et al. (1980).

CONCLUSION

1. That the rural and urban school children in Umuahia North Local Government Area of Abia State, Nigeria are not malnourished on the average despite the individual differences.
2. These results suggest that location may have no influence on the nutritional indices of school children in rural and urban Umuahia.

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