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CHANGES IN VITAMIN A OF CHILDREN WITH PROTEIN ENERGY MALNUTRITION IN A RURAL COMMUNITY OF IMO STATE.

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ABSTRACT

The changes in vitamin A levels of children with protein energy malnutrition in the rural communities of Imo Nigeria carried out August 2002 and March 2008 to the changes in vitamin A of malnourished children. A total of one hundred and ninety-seven children (89 boys 108 girls) under 5 of age Ninety-nine children (50%) comprising 45 (22.8%) males and 54 (27,4%) with malnutrition used while ninety-eight (50%) healthy age children were as control comprising 44 (22_3%) males and 54 (27.4%) We estimated the levels of serum vitamin A, total protein, albumin, globulin, in the serum of 99 protein energy malnourished imo children and "98 non-malnourished children in the rural community. Vitamin A, protein, albumin, globulin significantly in malnutrition children malnutrition in significant reduction of serum vitamin A, total protein, albumin in children. There was no significant difference in the mean values of biochemical parameters between boys and girls in the control while significant difference in the mean values of the vitamin A, protein, albumin, between boys and girls malnourished children.The study shows that vitamin A level is significantly lowered in protein energy malnutrition children and it is therefore recommended for this category of children.

KEYWORDS: changes in vitamin A, protein energy malnutrition, children in Imo State.

INTRODUCTION

Vitamin A deficiency is one of the major nutritional problems among pro-school children, school children, and lactating mothers residing in rural (Dhanamstta *et al.*, 1998). Vitamins are organic substances which are essential for normal growth and development. They must be included in the diet because the body cannot synthesize them at all or cannot do so in sufficient amounts for its in humans. Four are fat soluble- Retinol, (Vitamin A), carotene (A_1), vitamin D,E, and K, while the rest are water soluble: Vitamin C Vitamin B (B complex vitamins), thiamins (Vitamin B_1) Riboflavin (vitamin B_2) Niacin (Nicotinamide) (B_2) Patholenic acid, pyridoxine (B_6), folate (peteroylgtamate), cobalamins (vitamin B_{12}) Biotin and patothenate (Acott *et* al., 1995 Nwanjo, 2004; Acosta *et al.*, 2001).

Vitamin A is one of the fat soluble vitamins necessary for good health. Plays an important role as an antioxidant by helping to prevent free radicals from cellular damage.Adequate levels are important for good eye sight and poor night vision may be one of the first symptoms of its deficiency. It is necessary for proper fuction of immune, skeletal, respiratory, reproductive and intergumentary (skin) sysytems(Judith,2002).

Vitamin A is derived from two basic forms retinoid, the type contained in animal source like meat, whole milk, Eggs, butter, liver is very rich in vitamin A, Since it is one of the site for excess precursor forms of the vitamin A. Carotenoids are found in orange and leaf green, carrot, potatoes, winter squash, collard green fresh the highest of vitamin A. followed by frozen foods and little is found on canned (Judith 2002; Nwango ,2004), The conversion of beta-carotene into retinal in the human body is only 30% efficient (Barber *et* ***al.*, 2000).**The recommended daily recommended daily intake of retinal are 300mg to 400mg for infant, young children of 4 to 10years 500mg to 700mg, children of 11 years to 15 years 80Omg to 1000mg. Adolescents and lactating women 100mg to 1200mg (mg = 3 of IU)(Bates, 1995;Goodman *et al.*, 1996).

Most of the requirements in many of the world obtain this from carotenoid in vegetables foods.

According to Laurence *et al. (*2005), Vitamin A. is a generic term embracing substance having the biological action of retinal and related substances which are called retinoids.

In developing countries the prevalent form of childhood malnutrition Child is protein energy malnutrition.Micronutrient deficiencies also occur and often the same child may have protein energy malnutrition as well as insufficient micronutrient at the same time. Protein energy malnutrition to varying degree of deficiency of protein and calories clinical forms of protein energy malnutrition are Kwashiorkor, marasmus marasmic -kwashiorkor the forms depend on the balance between protein and non-protein sources of energy.

Programme aim to reduce childhood infection are by immunization based on micronutrient supplementation example vitamin A supplementation during immunization.

The World Health Organization (WHO, 1992) estimates that as many as 228 million children are affected sub-clinically at a severe or moderate level by vitaim A deficiency that deficiency of this micronutrient is a problem in more than 75 countries. UNICEF(United Nations International Children's emergency Fund) states that 200,000 children go blind each year because they do not have enough Vitamin A in their bodies which result to infections such as gastroenteritis, measles.

According to an article review on vitamin A deficiency in Nigeria (Rabiu and Kyaria, 2002), the paper review available vitamin A surveys in Nigeria, the relationship between VAD and childhood blindness and likely causes of vitamin A deficiency in Nigeria.

Many precipitate clinical vitamin A deficiency and the same mechanism can tip a child into frank protein energy malnutrition. It thus becomes clear that both conditions (VAD and PEM) can co-exist and indeed perpetuate each other in an unfortunate vicious cycle. Improving not only the macro but also the micronutrient status of patients will propel us towards the eradication of malnutrition which is the only way can eradicate extreme poverty the fist millennium development goal.

Vitamin A deficiency could result from habitually low intake as well as economic social and environmental factors that limit access to the use of vitamin A-containing foods. This is worsened during periods of increased physiological demand as in rapid growth and development during infancy and childhood as well as during pregnancy and location.

Vitamin A is an essential vitamin which carries out principal function in the body of children. Studies by Helen, (1992) reported that Vitamin A is Important for normal health and child survival.

The National Agency for Food and Drug Administration and Control (NAFDAC) has strongly emphasized through it's several public campaigns on the important of vitamin A.

However, in the Eastern part of Nigeria like Imo State, much has not been done on the changes in vitamin A level of children with protein energy malnutrition in a rural community of Imo State. Therefore, this study had revealed the importance and the need to enrich children's meals with vitamin A containing food stuff, encourage the production of manufactured Children's food products to be fortified with vitamin A and discourage the production and use of such food products deficient of vitamin A this time in children in Owerri !mo.

MATERIALS AND METHODS

The study Area

Ino state is located in area lying between co-ordinates $6^{0}55^{1}$-$^{0}03^{1}$E are $5^{0}27^{9}$-531^{1}N. It has an estimated population of about 127,213 persons based on the National Population commission 2005 with a relative humidity of 70%. Imo State sharing boundaries wit Umuahia and Aba in Abia State, Rivers State, the Eastern Nigeria part city and Anambra State and is cosmopolitan being home to many non-indigenes apart from te ethnic Ibo.

The study group comprised 197 children (108) and 89 boys) aged one month to 5 years. Of the number, 99 persons comprising 45 boys and 54 girls presenting with clinic feature of protein energy malnutrition . They were recruited from children outpatient and Emergency Wards of Emmanuel Iwuanyanwu Emerency Pediatric Unit, Motherless Babies Homes, Umuguma General Hospital, Mbano Hospital, Holy Rosary Hospital Emekuku of Imo State. The control group was made of 98 children (44 boys and 54 girls) of apparently healthy children, matched for age, sex, and socioeconomic status with the study group. The control group was recruited from the nursery and primary schools in the same town where these hospitals are located

Collection of blood samples: 5ml of venous blood was collected from children at the wards and outpatients and names, age, weight, height, and gender recorded. Serum was separated from the whole blood after centrifugation and stored at -4^{0}C.

Biochemical Analysis: Vitamin A was estimated with the report by Neeld and Pearson (193) using trichloacetic acid. Total protein was estimated using the method reported by biuret of Doumas 91975). Albumin was estimated by the method described by Bathlomen and Delany (1972). While serum globulin as assayed also by standard technique.

Statistical Analysis: The computation analysis was done using population of mean and standard deviation. Test of significance was by student Z score distribution and (P<0.05) was consideration as statistically significant.

RESULTS

Of the 99 children protein energy malnutrition, the mean values of serum vitamin A level were significantly reduced (P<0.05) when compared with the control children (table 1). Serum total protein, albumin, globulin levels were significantly lowered (P<0.05) in children with protein energy malnutrition than in the mean serum vitamin A, serum albumin, total protein, globulin boys and girls in the control, while there was no significant difference in the protein, albumin and globulin of protein energy malnutrition boys and girls (table 3).

However, there was no significant difference (P>0.05) in the mean values of total protein, albumin, globulin of protein energy malnutrition children in the age range of one –year and one month to 5 years (Table 4.). The albumin levels of both male and female subject has no significant difference (P>0.05) on malnourished and non-malnourished children.

TABLE1:Comparison of serum Vitamin A level of malnourished and non-malnuorished children.

Parameter	Non-malnourished Chidren (n=98)	Patients N=99	Comparison
Serum vitamin A	190.0 ±15. 2	148.0 ± 18.6	P<0.05

TABLE 2: Comparison of table protein profile of malnourished and non- malnourished children.

Parameter	Non-Malnourished Children (n=98)	Patients	Compariso H
Serum protein	**13.1 ±1.3**	**9.8 ± 2.3**	**P<0.05**
Serum albumin	**8.3 ±1.1**	**4.9 ±1.0**	**P<0.05**
Serum globulin	**4,9 ±1.9**	**4.9 ±1.0**	**P>0.05**

TABLE 3:Mean values and standard deviation of VitaminA and serum protein profile in relation to sex,

Biochemical Parameters	Sex	Control (n=44 boys n=54 girls)	Patients (11=44 boys n=54 girls)	Comparison
Vitamin A	Male	94.7 ± 8.0	80.9 ±8.5	P<0.05
	Female	96.1 ±7.3	69.8 ±8.1	P<0.05
Protein	Male	6.6 ±0.7	4.9 ±1.3	P<0.05
	Female	6.5 ±0.6	4.8 ±1.3	P<0.05
Aibumin	Male _	4.0 ±0.5	2.4 ± 0.8	PO.05

Tale 4 The mean values and standard deviation of biochemical parameters according to age brackets of malnourished and non-malnourished children

Age (month, year)	Parameter	Non-mainoyrished (n - 98)	Malnourished children (n - 99)	Comparison
0.01 -1.0	Protein	12.7 + 1.0	11.0 + 17	P<0.05
1.1 - 2.0	(g/di)	12. 9 ±0.8	6.7 + 1.4	P<0.05
2.1 - 3.0		13.5 + 1.6	6.5 + 0.2	P<0.05
3.1 - 4.0		13.3±1.4	8.6 ±0.4 t.; .:	P<0.05
4.1 - 5.0		13.4 + 1.2	7.1 ±1.0	P<0.05
0.01 -1.0	Globulin	4.8 ±0.8	5.8 ±1.5	P>0.05
1.1 - 2.0	(g/di)	4.9 + 0.8	2.9 ±0.3	P<0.05
2.1 - 3.0		5.1+0.9	2.7 ±0.2	P<0.05
3.1 - 4.0		4.8+1.0	2.8 + 0.7	P<0.05
4.1 - 5.0		5.0 + 0.9	2.9 + 0.4	P<0.05
0.01 -1.0	Albumin	7.8+1.4	5.2 + 0.8	P<0.05
1.1 - 2.0	(g/dl) .	7. 9 ±1.0	3.8 ±1.3	P<0.05
2.1 - 3.0		8.4+1.2	3.9 + 0.1	P<0.05
3.1 - 4.0		8.5+1.0	3.8 + 0.1	P<0.05
4.1 - 5.0		8.6+1.1	4.1 ±0.7	P<0.05
0.01 -1.0	Vitamin A	189.9+15.2	149.4 + 22.2	P<0.05
1.1 - 2.0		188.7 ±10.6	153.8 ±8.8	P<0-.05
2.1 - 3.0		191.3+14.1	154.3 ±13.3	P<0.05
3.1 - 4.0		187.9+14.3	149.5 ±10.4	P<0.05
4.1 - 5.0		193.0 ± 15.5	147.5 ±11. 5	P<0.05

DISCUSSION

This study has shown the level of serum vitamin A in children with protein energy malnutrition on biochemical parameters. A significant reduction was observed in the parameter investigated in the malnourished children (Table 1, 3, and 4.) This is in agreement with the works of Lalwani et al. (1997); Ibeziakor (1981); Khali and Waly 1998); Manson and River (1997); Nourishes et al .(1995); Golvers et al. (1997). The reduction in the above parameters, in protein energy malnutrition could be due to low intake, prolonged dietetic deprivation of protein and calories, malabsorption of vitamin A rich foods, inadequate hepatic stores of vitamin A, increased utilization during infection and protein deficiency which impairs intestinal absorption, transport and metabolism of carotene to vitamin A. Due to protein deficiency, there is lack of release of lipids fro liver as lipoproteins and hence, these get accumulate in liver, leading to hepatic steatorrhea (Flore et al., 1990).

Reduced serum/plasma protein level can result from increase protein catabolim, commonly present in feverish conditions. The changes in serum vitamin A level in protein energy malnutrition children have been shown to be sex-dependent, as there were gender differences in the assayed vitamin A parameter. However, those of protein level showed no gender differences as male tend to have the same protein profile value with females. The vitamin A level are reduced in both gender, but the female patient showed more reduction of vitamin A than male patient. However, the reduction of vitamin A level as seen in malnourished children is consistent with the earlier findings of Jain et al. (1990) who stated that the effect of protein energy malnutrition interferes with hepatic synthesis and release of retinol binding protein (required for vitamin A transport) from the liver which now reduces a defective retinol transport leading to a decrease in the serum retinol level serum retinol transport system is also influenced by the liver releases retinol binding protein in response to its vitamin A stores (hepatic vitamin A stores) and when stores low as in protein energy malnutrition, or very low amount are released which also cause defective transport leading to a decrease in the serum vitamin A level.

There was also reduced serum total protein profile especially albumin in protein energy malnutrition, which is in line with the earlier report of Lalwani et al. (1998) who attributed this to result from the consumption of diet efficient in protein.

Furthermore, malnourished children with protein energy malnutrition have reduced body mass index believed to result from wasting (Jain et al., 1990). It was observed that there were significant reduction (P<0.05) in the mean value of serum vitamin A, total protein, albumin, globulin of malnourished subject when compared with control in relation to age range.

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REFERENCES

1. Acosta, E.C. Alamara, G.O., Alakawara, H..E., Josbson, E.F. Protein and vitamin A deficiency in children. J. Trop. Pediat. 2001; 70 (11); 22-24.
2. Acott, G.C., Kanai, M. Raza, Goodman, D.S The transport for vitamin A in pasma. Quarterly journal of Medicine, 2005; 96: 505-512.
3. Barber, E.W., Perera, W.D., Broske, S. Vitamin A status oof children in SriLAnka. American Journal of Clinical Nutrition 2002; (32): 4-91.
4. Bates, L.C, A brief guide to cureent methods of assessing vitamine A status. Journal of nutrition, 1995; (120): 1459-1563.
5. Dhannamitta,S., Stocker, BVallyasevi, A. (998). Community approaches to prevention of vitamin A deficiency . paper presented at the IVACE meetings, Jakarta Indonesia.
6. Flores, H., Pak, N., Maccaroni, Manckeberg 919900: Lipid transport in Knwashiorkor. British Journal of Nutrition (24): 1005-1011.
7. Glover, J.P., Psvesiey, K., Gabourg, G.L 91997): protein energy malnutrition. Vitamin A deficiency, and night blindness in BAnyadeshi children. Annual Tropical, Paediatric (16): 319-325.
8. Goodman, Gilman, hardman, J.G., Limbird, L.E., Malinoff, R. (1996): the pharmacological Basis of Therapeutics, 9th Ed. McGraw Hill Division Companies. 1990-1995.
9. Helen keller International Vitamin A deficieny and childhood mortality. Journal on Community Eye Health, 1992; (10): 15-16.
10. Ignatius Akhakhia Onimawo Nutrition for the vunerable group, 1st Ed Ambik Press Benin City. 2001; 3-70.
11. Jain, M.K Mehta, N.., Fonseca, m.M., Pai N.V. (19900 correlation of serum vitamin A and its transport protein (PBR) in malnourished and vitamin A deficient children. Post

graduate Medicine Journal 36 (3): 119-230.

12. Judith Turner (002) "Vitamin A; Information on Health line Journal. Gale Encylopeia of Nigeria and allied Health .
13. Khali, A. and Waly, J.M Effects of dietary deficiencies of protain and retinol in the plasma Medical Clinic of north American, 1998; 61 (1): 89-91.
14. Lalwani, S.G., Karande, S., Khemann, R., Jain, N.K. ULTRAONSGRAPHIC Evaluation of hepatic steatois in malnutrition in India Paediatrics, 1998; (35): 650-652.
15. Lawrence, D.R., Benett, P.N., and Brow, M.I. Clinical pharmacology. Chur chill Living stone Harcourt Brale. 2005; 660-662.
16. Manson, C.B and River, R.E Vitamin A deficiency and Xeroptalia Quarterly Journal of Medicin, 1991; (99): 569-579.
17. Moriess, G., Raz, A., MAucin, G., Carbonara, AO. Regulation of retinal binding protein metabolism by vitamin, A state in the human. Journal of Biological Chemistry, 1997: (247): 2442-2550.
18. Nwanjo, H. U. Vitamins in; metabolic control in Health and disease, 1st Ed. Crystal Pblishers, Owerri. 2004; 163.
19. Neeld, J.B. and Pearson W.N Macro methods for the determination of serum vitamin A using TCA Journal of nutrition, 1963; (99): 454-462.
20. RAbiu, M..M., Kyari, F. (200): Vitamin A deficiency in Nigeria. Journal of Medicine (11):1.
21. Wold Health Organization (1992) prevention of childhood blindness and current control measures. WHO Geneva: 18
22. Helen keller International Vitamin A deficieny and childhood mortality. Journal on Community Eye Health, 1992: (10): 15-16.
23. Ignatius Akhakhia Onimawo Nutrition for the vunerable group, 1st Ed Ambik Press Benin City. 2001; 3-70.
24. Jain, M.K Mehta, N.., Fonseca, m.M., Pai N.V. (19900 correlation of serum vitamin A and its transport protein (PBR) in malnourished and vitamin A deficient children. Post graduate Medicine Journal 36 (3): 119-230.
25. Judith Turner (002) "Vitamin A; Information on Health line Journal. Gale Encylopeia of Nigeria and allied Health .
26. Khali, A. and Waly, J.M Effects of dietary deficiencies of protain and retinol in the plasma Medical Clinic of north American, 1998; 61 (1): 89-91.
27. Lalwani, S.G., Karande, S., Khemann, R., Jain, N.K. ULTRAONSGRAPHIC Evaluation

of hepatic steatois in malnutrition in India Paediatrics, 1998; (35): 650-652.

28. Lawrence, D.R., Benett, P.N., and Brow, M.I. Clinical pharmacology. Chur chill Living stone Harcourt Brale. 2005; 660-662.
29. Manson, C.B and River, R.E Vitamin A deficiency and Xeroptalia Quarterly Journal of Medicin, 1991; (99): 569-579.
30. Moriess, G., Raz, A., MAucin, G., Carbonara, AO. Regulation of retinal binding protein metabolism by vitamin, A state in the human. Journal of Biological Chemistry, 1997; (247): 2442-2550.
31. Nwanjo, H. U. (2004). Vitamins in; metabolic control in Health and disease, 1st Ed. Crystal Pblishers, Owerri. 163.
32. Neeld, J.B. and Pearson W.N Macro methods for the determination of serum vitamin A using TCA Journal of nutrition, 1963; (99): 454-462.