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Micronutrients Level In Control And Malnourished Children

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Abstract
Vitamins are called micronutrients as they are needed in miniscule amount. As tiny as the amounts are, the consequences of their absence are severe. The current study was done to assess the levels of vitamins (A and E) in children suffering from P.E.M. and compared with apparently healthy children. There was a significant decrease in the levels of vitamins in P.E.M. children as compared to control ($p<0.05$).
Key Words – PEM, Vitamin A, Vitamin E, Antioxidants, Micronutrients.

Introduction

Protein-energy malnutrition unfortunately remains a significant problem both in developing countries and in poverty stricken areas of the industrialized world. Protein-energy malnutrition(PEM) may present as the classic syndromes of marasmus and kwashiorkor or more commonly between the two. Malnutrition involves deficiency of not only the macronutrients but also results in subphysiological concentration of most micronutrients[1]. Micronutrients are required in small quantities are responsible for vital functions of the human body. The intake of micronutrients in daily diet is far from satisfactory and largely less than 50% RDA is consumed by over 70% of Indian population. The consequences of micronutrient malnutrition are unacceptably high morbidity and mortality.[2] Vitamin A, Iron and Zn deficiency when combined constitute the second largest risk factor in the global burden of disease. Vitamin E is a fat soluble antioxidant that plays a vital role in scavenging of free radicals that causes inflammation leading to vascular leakage that leads to edema in Kwashiorkor[3].

The aim of the study was to assess the level of vitamin A and E children suffering from malnutrition.

Materials and Method

This study was carried out in 375 children suffering from PEM (age 1-3yrs) and 175 children with apparently normal and healthy physique and presenting with no clinical or anthropometric signs or symptoms suggestive of any form of malnutrition were used as control group (age1-3yrs) . The study protocol and procedures were approved by M.G.M College ethical committee.

Parameter	Control n=175	PEM n=375	p-value
Vit A µmol/L	1.162±0.062	0.64±0.063	<0.0001
Vit E µmol/L	17.02±1.962	11.41±0.446	<0.0001

Biochemical analysis

Method to determine vitamin A

TFA is reacted with conjugated double bond system of the organic solvent extracted compounds to produce a blue color according to Neel-Pearsons procedure[4].

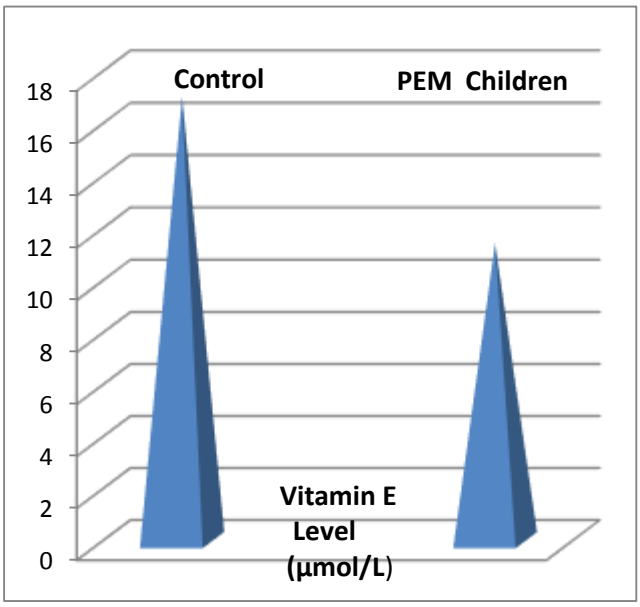
Method to determine vitamin E.

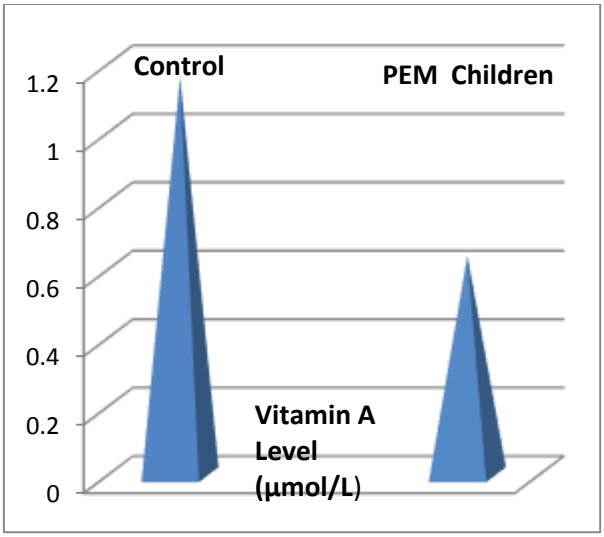
An equal volume of absolute ethanol precipitates the plasma protein ,the whole mixture is subjected to extraction by an equal volume of n-heptane. The αα'dipyridyl is added to aliquots of the upper layer to estimate the principle interfering substance β- carotene at 460nm. At the time the ferric chloride reagent is added to system to produce red color obtained by Emmire-Engel procedure that is measured spectrophotometricaly at 510nm[5].

Statistical analysis

Data was analyzed for mean and standard deviation. Difference in parameter were tested for statistical significance at $p<0.05$ using student "t"test.

Mean serum vitamins levels in control and malnourished children





Discussion

The mean level of Vitamin A was reduced in PEM children as compared to control and is in accord with the previous study done [6]. Vitamin A is an essential micronutrient for the normal function of visual system, for growth, development and maintenance of epithelial cellular integrity as well as for immune function and reproduction[7]. Effect on sub epithelial barriers and on the immune system occur even with sub-clinical deficiency leading to increased of some infections and an increased risk of death among children[8]. In Vitamin A deficient children , cells lining the lungs lose their ability to remove disease causing microorganism and this may contribute to pneumonia associated with Vitamin A deficieny[9].

The mean level of vitamin E was reduced in PEM children compared to control and is in accord with the previous studies[10]. Vitamin E is a lipid soluble antioxidant and deficiency results in increased free radical damage to RBC[11]. Vitamin E may improve T-cell function by decreasing macrophage PGE2

Production by modulating the AA cascade initiated by lipooxygenase and cyclooxygenase[12].Vitamin E deficiency in PEM could be due to reduced consumption through inadequate diet . This limited intake of food would also lead to limit the protein necessary to synthesis of α- TPP, required for regulation of

plasma α- tocopherol , hence inadequate synthesis of TPP, would lead to deficiency of vitamin E[13]. The concentrationof vitamin E do not accurately reflect intracellular stores as it is subjected to changes in dietary intake and plasma lipid peroxidation[14].

Conclusion

Micronutrient malnutrition is primarily the result of inadequate dietary intake. Dietary surveys in developing countries have consistently shown that multiple micronutrient deficiencies, rather than single deficiencies, are common, and that low dietary intakes and poor bioavailability of micronutrients account for the high prevalence of multiple deficiencies.

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