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RESEARCH ARTICLE

Selected Micronutrient Status Of Adolescent Girls In Medchal Mandal Of Ranga Reddy District, A.P

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Abstract

Adolescent girls in the 14-16 years age group were selected from villages in the Medchal mandal of Ranga Reddy district. Anthropometric and dietary data was collected using standard methods. Blood samples were drawn and analyzed for hemoglobin, vitamin A and zinc. Study results showed that 78% of the subjects were anemic, 72.1% deficient in vitamin A and 33.8% had deficient zinc levels. Dietary intake of the nutrients by the subjects was also low. Improvement of dietary intake through education and supplementing the concerned micronutrients in medicinal form were the measures suggested to overcome micronutrient deficiencies.

INTRODUCTION

Adolescence is characterized by rapid growth with profound, complex and interrelated changes. In girls these changes play a crucial role in the successful outcome of pregnancy and lactation at a later stage. Micronutrients like iron, vitamin A and zinc, required in micro quantities, are essential for growth, development, utilization of macronutrients, immunity and many other physiological and metabolic functions. Any deficiency of these essential micronutrients adversely affects growth and amplifies the risks to the individual's health. In the case of females, this increases the likelihood of damage to future generations through fetal growth retardation and limited ability to cope with stress. Micronutrient deficiency is at epidemic proportions in many countries including India, in spite of decades of nutrition programmes.

The problem of getting sufficient micronutrients occurs when a girl child enters adolescence, a time when growth and requirements accelerate. Deficiencies arise from inadequate intakes, impaired absorption or utilization, excessive losses or a combination of these factors Adolescence is the best period to correct nutritional deficiencies, so, data on the nutritional status of this group is required. Hence this study was conducted to assess the micronutrient status of adolescent girls between 14 and 16 years of age. Both anemia and vitamin A deficiency are very common among adolescents and they were assessed based on Hemoglobin and serum vitamin A levels. Zinc is yet another micronutrient which is essential for normal growth and is reported to be deficient in Indian diets, therefore serum levels of zinc were also assessed.

Materials and Methods:

The study was conducted in five villages randomly selected from Medchal mandal of Ranga Reddy district, Andhra Pradesh. The list of adolescent girls in the age group of 14 - 16 years in each village was obtained from the Community Health Volunteers of the village. Informed oral consent was obtained from the parents of the girls included in the study. The subjects were then interviewed to obtain the required information. Diet survey was carried out in the home of each subject by weighment method. Blood samples were collected by a trained technician using standard procedures. The blood sample was transferred to an amber coloured bottle containing EDTA di sodium salt. Hemoglobin was estimated from the whole blood by Cyanmethemoglobin method (Dacie and Lewis,1975)Serum was separated by centrifuging the blood samples and it was stored at -20◦C for analysis of vitamin A and zinc at a later date. Vitamin A was estimated by HPLC metho (Miller and Yang,1985) Serum zinc was estimated by Atomic Absorption Spectrophotometry (Butrionovitz and Purdy,1977)

Results and Discussion

Results of the diet survey show that diets consumed did not meet the nutritional requirements of the subjects(Table1). Iron intake was particularly low and met only 48% of RDA. The RDAs for zinc and Vitamin A were met only to 68.6% and 74.9% respectively.

The prevalence of anemia among the 68 girls of 14-16 year age group is given in Table 2

On the whole 77.9% of the girls were anemic and the mean hemoglobin level of the subjects was10.94 ±1.9 g/dl. About 45.6% of the subjects had mean hemoglobin levels of 11g/dl which indicates mild deficiency, while 30.9% of them were moderately anemic with hemoglobin at 9.2g/dl. Severe cases of anemia were not seen. Thus, only 22% of the subjects were normal with hemoglobin at 13.5 g/dl.

Other studies, in India have indicated high anemia prevalence among adolescent girls. Chaturvedi et al (1996) reported a prevalence of 73.7% among the adolescent girls in Rajasthan. Vijayalakshmi (2000) reported 82% anemia prevalence among adolescent girls of rural Ranga Reddy district. Adolescent girls are vulnerable to anemia due to loss of iron from the body with the onset of the menstrual cycle. Moreover, their intake of iron rich foods and iron absorption enhancers is poor.

Table 3 gives the vitamin A status of the subjects.

From the table it is seen that 19(27.9%) subjects have a mean vitamin A level of 34.36µg/dl which indicates normal levels. On an average 49 (72.1%) of the subjects were deficient in vitamin A as indicated by their low serum vitamin A levels. A majority of them were mildly deficient (38) while moderate deficiency was seen in 11 subjects. Studies on vitamin A nutritional status of adolescent girls based on biochemical examination are scarce in our country and most studies are based on clinical examination. Imelda Angeles-Agdappa et al (1997) reported a prevalence of 54.7% vitamin A deficiency among Indonesian adolescent girls while Person et al (2000) found a prevalence of 50% among Bangladeshi adolescent girls. The poor intake of milk as well as the inexpensive sources of vitamin A precursors such as green leafy vegetables and yellow-orange vegetables could be the cause of this high prevalence of deficiency. The study was conducted during the summer season when fresh vegetables were scarce, so this may have lead to poor availability and consumption and therefore deficiency. Seasonal fluctuations in serum vitamin A levels due to changes in the intake of carotenoids have been reported by other workers too.(Guangwen Tang et al, 2000)

The zinc nutritional status of the subjects is seen in Table 4. It is seen from Table 4 that 45 subjects (66.2%) had normal zinc concentrations and 2 (33.8%) were deficient with serum levels below 70 mg /dl. Low consumption of whole grains and fleshy foods could have resulted in deficiency. Another cause of deficiency could be the low zinc content of the soils of Ranga Reddy district, the location of the study. Venkatasubbaiah et al (1995) have reported a 25-50% deficiency in soil zinc of this district which in turn leads to low zinc levels of grains grown in the area and thus a possibility of zinc deficiency in the consumers.

Tables

Table 1: Mean Nutrient Intake of the subjects

S.No	Nutrient	Dietary intake by subjects	RDA*	% RDA met by diet
1	Energy (KCals)	1636	2060	79.4
2	Protein (g)	46.7	65	71.8
3	Fat (g)	18.4	22	83.4
4	Iron (mg)	13.5	28	48.0
5	Calcium (mg)	304	600	50.7
6	Zinc (mg)	10.6	15.5	68.6
7	Vitamin A (µg)	1797	2400	74.9
8	Vitamin C (mg)	61.6	40	154
9	Thiamin (mg)	0.887	1.0	88.7
10	Riboflavin (mg)	0.83	1.2	69.2
11	Niacin (mg)	12.5	14	89.3

***** ICMR (1998)

Table 2: Hemoglobin status of subjects

S.No	Groups	Cut off values	No. of subjects	Mean Hb levelsg/dl
1	Non anemic	12g/dl	15 (22%)	13.57
2	Mild	10 -11.99 g/dl	31 (45.6%)	11.0
3	Moderate	7 – 9.99 g/dl	21 (30.9 %)	9.2
4	Severe	< 7 g/dl	1 (1.5%)	6.8
	TOTAL		68 (100%)	**10.94±1.9**

*INACG (1977)

Table 3: **Vitamin A status of the Subjects**

S.No	Vitamin A status	Cut off values*	No. of Subjects	Mean Vitamin A levels (µg/dl)
1	Normal	>30 µg/dl	19 (27.9 %)	34.36
2	Mild Deficiency	20-29µg/dl	38 (55.9%)	24.47
3	Moderate deficiency	10-19 µg/dl	11 (16.9%)	16.8
4	Severe deficiency)	< 10 µg/dl	0	-
	TOTAL		68(100%)	**26.9 ± 6.5**

* FAO/WHO (1993)

Table 4: Zinc nutritional status of the subjects

S.No	Zinc Status	Cut off values*	No. of Subjects	Mean Zinc levels
1	Normal	(> 70 mg/dl)	45(66.2)	97.8
2	Deficient	(<70 mg/dl)	23 (33.8)	62.78
	TOTAL		68 (100)	**85.07 ±22.9**

*****FAO/WHO (1993)

Conclusion

Iron, zinc and vitamin A are metabolically linked. Zinc is known to influence vitamin A metabolism (Smith et al, 1976) and vitamin A allows the release of iron which is stored in the liver when transferrin synthesis is resumed. In most cases of micronutrient deficiency, individuals are deficient not in one nutrient alone. Generally multi micronutrient deficiencies occur because of inter actions between micronutrients. From the results of the study it is seen that the subjects were deficient in all nutrients tested that is, vitamin A, zinc and iron and among all, iron deficiency was more as reflected by low hemoglobin levels. Studies have shown that supplementation of iron, vitamin A and zinc together cause a significant increase in hemoglobin level than in groups supplemented with iron and vitamin alone (Kolsteron et al, 1999). So a supplementation of all three nutrients in proper proportions will help overcome nutrient deficiency problems in adolescent girls and prepare them for their role as future mothers.

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