Monitoring calcium and iron deficiencies at low cost in rural girls

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ABSTRACT

Calcium and Iron are two most vital minerals required by our body. Any deficiency of these two may result into a number of disorders and diseases, such as, rickets, osteomalacia, poor body growth, poor digestion, delayed dentition, anaemia etc. People from middle and some from upper classes too suffer from these deficiencies, either because of poor knowledge or because of their food habits. Milk, pulses, nuts and animal foods are unaffordable for people from lower income group. Supplementary foods at low cost are found to be most effective in increasing the calcium and iron status of rural girls of Orissa.

Key words : Supplementation, Anaemia, Pallor, Anthropometric.

Requirement of calcium and iron increases in young girls with the onset of menarche. Height increases very fast during 10-12 years of age in girls and thus increment in requirement of calcium is quite obvious for proper growth of bones. Iron is very much essential at puberty and inadequate dietary intake of it makes the young girls highly susceptible to anaemia. More than 320 million people in India suffer from iron deficiency anemia of which 50% are adolescent girls. Supplementation of iron remains an important strategy for treatment of iron deficiency anaemia, producing substantial improvement in the functional performance of adolescent girls.

Girls from middle and some from upper classes too suffer from these deficiencies. Even some of the rural people having cattle, suffer from such deficiencies, as they sell out the milk. Government and many non governmental agencies are active in Orissa offering supplementary foods to poor. Mid - day meals have been introduced in schools in a number of states. For some it is an SOS as they get at least one full meal. For many, this forms the major part of their food in a day. However, these efforts lack in proper approach and menu combinations and the outcome are not satisfactory. Cereals and pulses form the major portion of diets of poor people. The paper here reports the studies of people affected with calcium and iron deficiencies and suggests ways to improve them with cost optimisation.

METHODOLOGY

Since the object was to emphasize and reveal the conditions of the lesser privileged child, study was concentrated on adolescent girls, who in the villages have to traditionally work more and are given inadequate quantities of foods. Then to have a better control and mix of girls from all categories of people, such as, people having different financial standing, food traditions/ habits, food eating practices, vegetarians and non vegetarians etc., some of the schools were directly approached. The area/ locality selected for study were Patrapada and Aiginia blocks of Khurda district of Orissa. Two different age groups, 10-12 and 13- 15 were selected and a representative figure of 80 girls from each age group was randomly selected and interviewed.

Random sampling was done and details of their food habits and foods taken and food practices were surveyed. For a more effective and dependable analysis, information of foods consumed during three consecutive days in any week was taken. For various categories identified, the degree of deficiencies was determined in each case. Standard Deviation was found and best fit curves were drawn. The overall Nutritional Status of the categories was determined to relate their health conditions with the food intakes. However, there can be many reasons and parameters for existing deficiencies and related health conditions, the study was based on following categorized variables -

Economy:

Economy, which has been one of the governing factors for all nutritional status has been considered here too but in a more rationalized form of share of Income per member of the family (referred here as SIM). Simply forming income as the basis is meaningless as the food intake or nutrition of a family will depend more on the number of the members in that family within the same income group. Further, this criterion has been subdivided

among low, medium and high income group.

Food culture:

Status of nutrition of people is again governed by its food culture and tradition like vegetarian or non-vegetarian. This food culture has a major impact on calcium and iron status of people and has been taken as another criterion/ category.

Food nature:

Nature of food consumed plays a major role in degree of absorption in the body and has also been considered as one of the variable criteria.

Food consumption practice:

Lastly the food consumption practices which besides all favourable criteria can nullify minimize or maximize the absorption of the nutrients in the body. This also has been considered here as fourth criterion.

Here, 40 anaemic girls from 13-15 years were taken for further study. They were divided into Group – A and Group – B with 20 in each group. Supplementary foods were fed to group A twice in a week and experiment was continued for 4 months. Group – B served as non-supplement group.

The anthropometric and clinical changes were observed before and after supplementation to achieve the objectives.

Further, in order to see the effect of the health promotional foods, specially selected calcium and iron rich foods, namely Ramdana and Mandia were fed as supplements to normal diet of the sample group.

RESULTS AND DISCUSSION

With the methodology and the investigations in the manner as discussed earlier, the summary of the respondents is put in Table 1. The nutritional determinants/ food intake and food habits/ culture etc, as discussed earlier were inquired from each and analysed on the following platform :

– Age group versus deficiency
– Sources of calcium versus deficiency
– Heam / non haem iron versus deficiency
– Share of income versus calcium intake
– Share of income versus iron intake

The results show that almost a large number of girls in both the age groups,10- 12 and 13-15 years, suffer from deficiencies of calcium and iron. 52.5% deficiency in calcium is found in girls of 10-12 yrs, whereas,67.5% deficiency is seen in girls of 13-15 yrs. The calcium consumption under different categories of sampling is put

Table 1 : variables for food intake/causes of deficiencies			
Sr. No.	Factors	No. of respondents	Percentage of respondents
1.	Economic status		
	– Low	77	48.125
	– Medium	64	40.00
	– High	19	11.875
2.	Calcium intake		
	–Vegetable origin	97	60.625
	–Animal origin	63	39.375
3.	Iron intake		
	– Haem iron	44	27.5
	– Non haem iron	116	72.5
4.	Poor food practices		
	*Improper combination	111	69.375
	*Poor cooking procedure	49	30.625

in Table 2 and that of iron is put in Table 3. It is seen that the deficiency of iron in vegetarian girls is higher than in non-vegetarian girls *i.e.* 39% and 69.64% in vegetarians
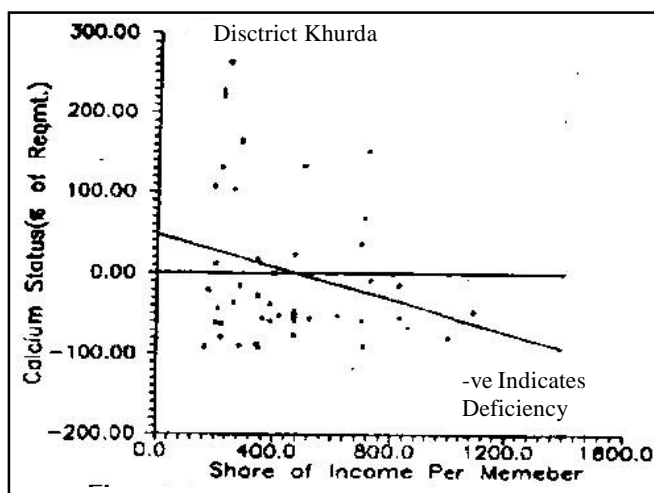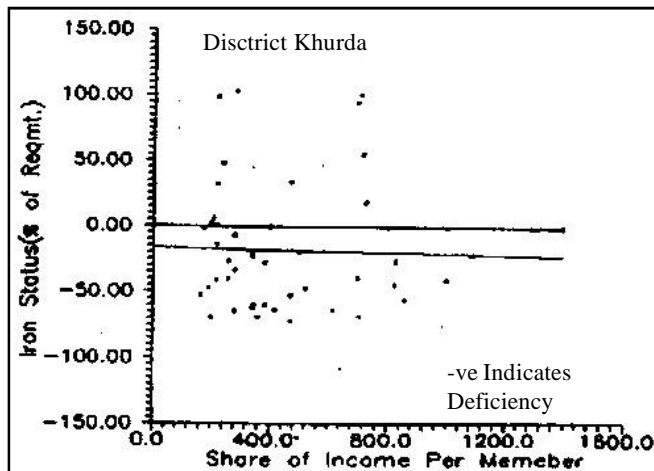

Fig. 1: Income versus calcium

Fig. 2: Income versus iron

Table 2 : calcium consumption

Sr. No.	Age group (in years)	Well nourished in % and (in number)	Over nourished in % and (in number)	Deficiency in calcium in % and (in number)
1.	10-12	27.5% (22)	20.0% (16)	52.5% (42)
2.	13-15	11.25% (9)	21.25% (17)	67.5% (54)
3.	10-12			
	* vegetarian	23.07% (12)	19.2% (10)	57.73% (30)
	* non-veg.	35.7% (10)	21.4% (6)	42.9% (12)
4.	13-15			
	* vegetarian	8.88% (4)	22.22% (10)	68.9% (31)
	* non-veg.	14.3% (5)	20.0% (7)	65.7% (23)

Table 3 : Iron intake

Sr. No.	Age group in years	Well nourished in % and (in number)	Over nourished in % and (in number)	Deficiency in iron in % and (in number)
1.	10-12	51%(40)	10%(8)	40%(32)
2.	13-15	18% (12)	10%(8)	75%(60)
3.	10-12			
	*vegetarian (Non-Haem)	50%(30)	10%(6)	40%(24)
	*non-veg. (Haem)	55%(11)	10%(2)	35%(7)
4.	13-15			
	*vegetarian (Non-haem)	21.43%(12)	8.93%(5)	69.64%(39)
	*non-veg. (Haem)	25%(6)	12.5%(3)	62.5%(15)

and 15% and 62.5% in non-vegetarians. Fig. 1 and 2 show the trend of calcium and iron deficiencies in share of income.

Some cheaper and good sources of high calcium and iron foods are available in our country. Vegetables such as palak, kusla etc. are incapable of tackling higher order deficiencies are little costlier too. Some of the best sources for calcium and iron are Ramdana (Amaranth seeds) and Mandia (Ragi). Though widely and easily available, very few people know about their mineral nutritive values. These foods find little consumption, either because of dislike or their appearance or just because of status point. They are considered as foods from lower strata and are not favoured by many. Though plenty of Ramdana is produced in some parts of Orissa but is not much known even among educated masses of Orissa. Any one of these is enough to supplement the total deficiency alone (Table 4).

As is seen the deficiencies existed are of higher order. Different clinical changes observed in the selected anaemic adolescent girls are presented in Table 5.

All symptoms reduced after the supplementation of

Table 4 : Nutrients in supplementary foods

Nutrients	Ramdana (Amaranth seed) mg /100gm	Mandia (Ragi) mg/100gm
Calcium	510.0	344.0
Iron	22.9	11.0

diet with Ramdana and Ragi. The symptoms like breathlessness and pallor skin were observed in 50% of the selected girls. But after supplementation the percentage of these symptoms reduced to 10% which is the maximum. There were almost no changes observed in Group – 'B' (control group). The mean body height and weight of the selected girls were 146 cm and 40 kg.,

Table 5 : Changes in clinical symptoms

Symptoms	Group – 'A'		Group 'B'	
	No. of person affected	No. of person affected after supplementation	No. of person affected	No. of persons affected after four months
1. Reeling of head	6 (30%)	2 (10%)	3 (15%)	3 (15 %)
2. Breath lessness	10 (50%)	2 (10%)	11 (55%)	13(60%)
3. Pallor conjectiva	15(75%)	5 (25%)	12(60%)	15(75%)
4. Pallor nails	12(60%)	4(20%)	8(40%)	8(40%)
5. Pallor skin	10(50%)	2(10%)	9(45%)	9(45%)

respectively which increased by mean 0.83 cm and 1.1kg., respectively.

As Ramadana and Ragi are rich in both calcium and iron, hence the changes were observed in anthropometric and clinical signs together.

Conclusion:

Due to the inadequate intake of calcium and iron, the percentage deficiencies in rural girls of 13-15years of age is higher than the girls of 10-12 years. Studies conducted revealed that iron deficiency in children is due to lower intake and poor purchasing power of rural people. The deficiency of iron is quite obvious in adolescent girls. In spite of their high nutritive value, Ramdana and Mandia are extremely under utilised. Ramdana is almost unknown in Orissa. So is Mandia in other parts of the country. Unaware of its nutritive value and also of the modes of consumption and methods of preparations, people are not even trying to use them. ICDS and other NGOs may take steps in educating the masses of their benefits and correct process of cooking. The supplementary diets and the mid day meals may include these cheaper and better foods in their plans. Supplementation of these foods in the diet may improve their calcium and iron deficiencies without appreciable increase in cost. The supplementation of the diet by micronutrients improves the health status of children. In villages, people can be educated to grow these foods more and more for their consumptions. Such plants can grow on almost any soil and hardly need any special care.

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