

Impact of Food Based Strategies on Nutrient Intake of Rural Adolescent Girls

Research Article

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Abstract

Nutrient intake during adolescence is very important as it is period of rapid development. The present study is an intervention study to know the impact of knowledge, awareness, attitude and practices on the nutrient intake of the adolescent girls. The pre intervention showed that adolescent mineral and vitamin intake was below the recommended dietary allowance. During the pre intervention the calorie intake was meeting only 70-75% of recommended dietary allowance. Protein intake was also found to be less than the required amount (on average only 85-90% adequacy for age group 13-16yrs). After intervention intake of food groups like rice, wheat, spinach, dark leafy vegetables, cabbage, eggplant, and mushrooms helped the experimental group in increased nutrient showing a significant difference from control group. The intake of calories increased to 85% adequacy level but proteins intake remained same. After intervention intake of vitamins like thiamine, riboflavin, B carotene, retinol increased. Minerals like calcium, iron and zinc intake of experimental group also increased due to food based strategies like increased knowledge and awareness of food groups and their functions.

Introduction

Adolescence is a transitional growth period, with increased demands for energy and nutrients. This period is marked by rapid physical growth, reproductive maturation and cognitive transformations. Good nutrition is needed to support the growth and developmental changes of adolescence. Total nutrient needs are higher during adolescence than any other time in the lifecycle. Nutrition and physical growth are integrally related; optimal nutrition is a requisite for achieving full growth potential. During this phase of life, diet should provide not only sufficient calories but also other nutrients such as protein, vitamins and minerals because they boost the immune system, support normal physical

growth and development. Nutrition is an input to the foundation for health and development. Joshi et al. concluded that majority of rural adolescent girls were under nourished [1]. There was significant association between socio-economic status (SES) and nutritional status of adolescent girls. Nutritional status has profound effect on health and school performance of adolescent girls. Deshmukh et al. reported that majority (53.8%) of the adolescents were thin, only 2.2% were overweight while 44.0% were normal [2]. Medhi et al. reported that 41.3% of the adolescent girls were thin [3]. Chaturvedi et al. reported that the calorie intake was deficient by 36%, 34% and 26%. Chaturvedi et al. reported that in the age group 10-12 years, 13-15 years and 16-18 years, the protein deficit was 29%, 32% and

23% respectively [4]. Yadav and Singh reported that the magnitude of stunting was 60% among the adolescents [5]. From these reviews it could be concluded that the nutrient intake of rural adolescent girls was not meeting the required dietary allowance and hence to tackle this, intervention was essential to change the attitude, knowledge, practice thereby increasing the nutrient intake of rural adolescent girls. Nutritional intervention required to improve intake of vitamins and minerals which are very important nutrient. Vitamins and minerals are important as they boost the immune system; support normal growth and development, and help cells and organs do their jobs. Hence the present study was taken up to assess the impact of food based strategies on nutrient intake of adolescent girls.

Materials and Methods

The present study was conducted in rural Telangana district. A sample 300 adolescent girls in age group of 13-16yrs attending government schools were randomly selected. Out of the 300 sample 70 girls who were anemic and under nourished were selected for the present study. From the sample of 70 adolescent girls in age group from 13-16years with 35 girls in each experimental and control group were selected. Data of energy and nutrient intake was collected with the 24-hour dietary recall and food record questionnaires. In the 24-hour dietary recall questionnaire, the participants were asked to recall and report all the nutrients, drinks, and dietary supplements they had in the past 24 hours. Data was collected before intervention and again with gap of three months post intervention data was collected. Nutrition models, standardized measuring cups, spoons and other tools were used to estimate the correct amount of consumed food. In the food record questionnaire, the students were asked to report their food consumption on a specific day based on the number of spoons, cups and other common measuring tools. The food record was taken continuously for period of 15 days where the participants recorded their daily intake of food. The advantage of the 24-hour dietary recall questionnaire is that it is completed without any prior notice. Hence, the respondents do not change their food intake. However, because it relies on the individual's memory, the participants may not remember all the foods they have. The data was analyzed using averages, SDs and t test to study the significant differences.

Results and Discussion

The nutrient intake of adolescent girls in three age groups before

intervention was presented in the Table 1. The nutrient intake, RDA and percent adequacy of each nutrient in each age group was presented in the table. Average intake of Calories and all nutrients in all age groups was observed to be less than the recommended dietary allowances except Fat intake in 16 years, Vitamin 'C' intake in 15 & 16 years, and Riboflavin intake in 14 years adolescents. The dietary fiber percent adequacy was found to be in range 80-90 percent in age groups 13-16yrs adolescent girls. From the study it could be concluded that the diet intake of adolescent girls was not supplying recommended allowances of vitamins like B carotene, Retinol thiamine and riboflavin. The diet was also found to lacking minerals like iron, calcium and zinc. The study indicated that the percent adequacy of energy was also less when compared to RDA.

The post intervention nutrient intake of experimental group in age 13-16yrs was presented in the above table. Average intake of Calories and all nutrients in all age groups was observed to be more than pre-intervention level except Fat intake in 16 years, Protein intake in 13-16years, Vitamin 'C' intake in 15 years, Riboflavin intake in 13-14 years and dietary fiber intake across 13-16 years adolescents. In addition, in 15 years adolescents', average intake of β -carotene and Retinol was less as compared to the pre-intervention levels [Table 2].

The impact of intervention was studied comparing the mean nutrient intake of experimental and control group. Average intake of the Carbohydrates, Fats, Total minerals, Calories, Calcium, Iron, Zinc, β -carotene, Thiamine and Riboflavin was significantly higher in post-intervention phase as compared to the pre-intervention phase. Average intake of the Protein and Vitamin 'C' was higher in post-intervention phase as compared to the pre-intervention phase but this difference was not statistically significant. Average intake of the Retinol was almost similar in both pre phase and post-intervention phase. Though average intake of the dietary fiber was higher in pre-intervention phase as compared to the post-intervention phase but this difference was not statistically significant. In a similar study Seema choudhary studied dietary pattern and nutrition related knowledge of rural adolescent girls and found that more than two third subjects had in adequate intake of calorie, protein and fat and high level of vitamin a deficiency prevailed in majority (>90%) of subjects [6]. Average intakes of macro and micronutrients (except vitamin a) were >70%

Table 1: Pre-intervention average nutrient intake and nutrient deficit amongst adolescents*.

Nutrients	13yrs			14yrs			15yrs			16yrs		
	Avg	RDA	% deficit	Avg	RDA	% deficit	Avg	RDA	% deficit	Avg	RDA	% deficit
Protein	44.63	51.9	86.0	46.74	51.9	90.07	47.26	51.9	91.07	51.20	55.5	92.25
Fat	34.29	40	85.74	31.55	40	78.89	33.01	40	82.53	40.09	35	114.55
Energy	1656.61	2330	71.09	1734.63	2330	74.44	1769.1	2330	75.92	1855.25	2440	76.03
Calcium	318.10	800	39.76	280.90	800	35.11	358.18	800	44.77	297.55	800	37.19
Iron	10.95	27	40.57	10.95	27	40.58	12.19	27	45.15	13.05	26	50.21
Zinc	5.066	11	46.05	5.19	11	47.19	5.22	11	47.49	5.27	12	43.92
Vitamin c	33.73	40	84.33	38.82	40	97.06	49.70	40	124.26	42.42	40	106.06
B carotene	2070.56	4800	43.136	2579.71	4800	53.74	2840.8	4800	59.18	2748.66	4800	57.26
Retinol	210	600	35	230.76	600	38.46	333.33	600	55.55	300	600	50
Thiamine	0.68	1.2	57.05	0.72	1.2	60.75	0.68	1.2	57.0	0.759	1	75.97
Riboflavin	1.11	1.4	79.57	1.48	1.4	106.11	0.81	1.4	58.07	0.95	1.2	79.74
Dietary fiber	127.24	150	84.83	137.44	150	91.63	141.0	150	94.00	164.86	200	82.43

Table 2: Post-intervention average nutrient intake and nutrient deficit amongst adolescents.

Nutrients	13yrs			14yrs			15yrs			16yrs		
	Avg	RDA	% deficit	Avg	RDA	% deficit	Avg	RDA	% deficit	Avg	RDA	% deficit
Protein	47.55	51.9	80.71	42.28	51.9	81.48	46.66	51.9	89.91	43.25	55.5	77.94
Fat	42.96	40	107.4	35.64	40	89.1	42.50	40	106.27	34.74	35	99.25
Energy	1979.69	2330	84.96	1871.18	2330	80.30	1989.0	2330	85.36	1912.99	2440	84.30
Calcium	447.83	800	55.97	472.43	800	59.05	525.16	800	65.64	283.13	800	35.39
Iron	16.58	27	60.61	17.56	27	62.81	16.71	27	60.38	15.67	26	61.45
Zinc	6.102	11	55.45	6.09	11	55.36	6.19	11	56.33	7.53	12	62.76
Vitamin c	55.21	40	138.04	50.37	40	125.92	47.54	40	118.87	42.38	40	105.95
B carotene	3300.10	4800	68.75	2384.07	4800	49.66	2706.8	4800	56.393	2742.10	4800	66.29
Retinol	340	600	51	346.15	600	51.69	333.33	600	50.22	300.75	600	50.12
Thiamine	0.75	1.2	62.52	0.74	1.2	62.3	0.72	1.2	60.79	0.75	1	75.15
Riboflavin	0.9	1.4	64.31	0.81	1.4	58.39	1.12	1.4	80.53	0.73	1.2	54.54
Ditery fiber	175.30	150	116.86	107.40	150	71.6	135.79	150	90.59	138.57	200	69.28

Table 3: Comparison of average nutrient intake in pre and post-intervention phase.

Nutrient	EXPERIMENTAL		CONTROL		tvalue	Pvalue
	Mean	SD	Mean	SD		
Carbohydrates(gms)	345.78	34.62	327.75	32.33	2.251	0.02*
Protein(gm)	45.29	8.81	43.37	7.37	0.988	0.326
Fat (gm)	38.96	12.13	24.15	13.81	4.766	0.001**
Total minerals (gm)	6.902	1.37	6.411	1.09	2.659	0.02*
Crude fibre (gm)	5.15	1.87	11.67	42.9	0.893	0.372
Energy (kcal)	1933.5	216.51	1794.60	180.15	2.917	0.0048**
Calcium(mg)	463.24	203.48	354.97	84.9	2.905	0.0049**
Iron(mg)	12.28	4.003	10.37	2.49	2.3969	0.019*
Zinc (mg)	6.29	0.80	5.62	0.60	3.963	0.002**
Vitamin C (mg)	51.49	26.81	43.0	16.22	1.602	0.113
Beta-carotene (µg)	2660.119	1287.38	2445.35	1344.8	2.0682	0.05*
Rationalol (µg)	129.04	39.97	129.73	51.94	0.164	0.86
Thiamine (mg)	0.75	0.19	0.69	0.16	1.993	0.05*
Riboflavin (mg)	0.9	0.5	0.702	0.30	2.008	0.048*

of the RDA and average intakes of both macro and micronutrient (except vitamin a) were least in 13-16 years age group. The study also reported that access of nutrition related knowledge was poor for adolescent girls. Their nutrition related knowledge was not up to the mark and majority of them were not aware about their nutritional needs. Ignorance about micronutrients and protective foods prevailed in adolescent girl. In another study Sneha Prakash, imparted nutrition education through audio-visual aids for three months in college settings [7]. Before and after imparting nutrition education, the changes in eating patterns were evaluated by questionnaire method. The study showed that dietary intakes for energy and fats were more than adequacy, while protein and iron consumption was more according to comparison with RDA. A significant improvement in their nutritional knowledge was observed after giving Nutritional Education Programme [Table 3].

Conclusion

Average intake of Calories and all nutrients in all age groups was observed to be less than the recommended dietary allowances except very few nutrients in certain age groups. After intervening with 'Food Based Strategies' which included advocacy for increased intake of Green Leafy Vegetables especially dark green leafy vegetable the

average intake of Calories and almost all nutrients in almost all age groups was observed to be more than pre-intervention level. Thus the authors conclude that 'Food Based Strategies' had a positive impact on the average nutrient intake of rural adolescents.

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