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**Dr. Jyoti Sachan**

Associate Professor in Food and Nutrition, Department of Home Science, SMM Govt. Girls College, Bhilwara, Rajasthan, India

## Food and nutrient intake of rural adolescent girls of Rajasthan state

**Dr. Jyoti Sachan**

### Abstract

During adolescent period, rapid changes in physical growth and psychosocial development have placed these young adults in nutritionally vulnerable groups with poor eating habits that fail to meet essential dietary requirements. Health of adolescent girls has intergenerational effect. Objectives: To assess the dietary intake of various food items amongst adolescent girls and to assess the nutrient intake amongst adolescent girls. Materials and Methods: A cross-sectional study was conducted among 420 rural adolescent girls of Bhilwara District of Rajasthan, with the help of a predesigned and pretested questionnaire. Information were collected regarding socio-demographic features and dietary pattern, dietary intake and nutrient intake of girls who were willing to participate. Results were analyzed with the help of Microsoft Excel 2007 and SPSS version 16.0 statistical software. Result Intakes of cereals, pulses, green leafy vegetables, fats and oils and sugar and jaggery were significantly lower than the RDI. Majority of subject had protein intake less than 65%. The mean intake of food energy, protein, iron, ascorbic acid, beta carotene, thiamine, riboflavin and niacin in all the age group were lower than the recommended value. Conclusion: Majority of the adolescent girls have tendency to consume junk food and not enough food rich in iron sources and intake of nutritious food such as milk, protein-rich food, green leafy vegetables, and fruits was not enough according to ICMR standards.

**Keywords:** Adolescent, vulnerable groups, nutrition, nutrient intake, dietary pattern

### Introduction

There are almost a billion young people in the world, who make up 20-25 percent of the total population of developing countries. This particular population group is likely to grow rapidly over the next 30 years due to population growth. Due to the sudden and extraordinary growth occurring at this stage, the nutritional requirements will also increase greatly compared to previous years of growth. At this stage, the food must provide sufficient calories, as well as essential elements and nutrients such as proteins, vitamins and minerals, which are necessary for growth. Health of adolescent girls has intergenerational effect. A healthy adolescent girl becomes a healthy antenatal mother and gives birth to a healthy baby. Good nutrition during adolescence is critical to cover the deficits suffered during childhood and should include nutrients required to meet the demands of physical and cognitive growth and development, provide adequate stores of energy for illnesses and pregnancy, and prevent adult onset of nutrition-related diseases. A large percentage of adolescents in India suffer from nutritional deficiencies (WHO; 2006) [12]. To develop an appropriate strategy to combat poor nutrition and possible morbidity and mortality in adolescents, research about nutrition is necessary. Therefore, this study was conducted to find out the nutritional intake of adolescent girls in rural Bhilwara.

### Objectives

1. To assess the dietary intake of various food items amongst adolescent girls.
2. To assess the nutrient intake amongst adolescent girls

### Methodology

It was cross-sectional community based study conducted in the rural area of Bhilwara district. A sample of 420 rural adolescent girls (aged 10-19 years) were selected from 21 randomly selected anganwadi centers of Suwana panchayat samiti of Bhilwara district, Rajasthan.

**Corresponding Author:**

**Dr. Jyoti Sachan**

Associate Professor in Food and Nutrition, Department of Home Science, SMM Govt. Girls College, Bhilwara, Rajasthan, India

The adolescent girls those who attended menarch were included in the study. Written permission was taken from the CDPO, Bhilwara and verbal consent was obtained from the subjects parent. All the data were collected and analyzed in Microsoft Excel.

Dietary survey was conducted, by three day 24-hr recall method using standardized cup set for three consecutive days in a week (which included two working and one non working day), to assess the food and nutrient intake. Three days dietary survey was followed to take care of the variation in diet.

**Food Intake:** The dietary pattern followed at breakfast, lunch, evening tea and dinner was noted down. Raw quantity taken for cooking as well as the cooked quantity was recorded in term of household measures (standardized cup set or by weight/numbers). The consumption of cooked food by the subject were also recorded to calculate the quantity of raw food intake. The mean intake of different food groups was then calculated and compared with balanced diet recommended by RDI (2011) [13] for adolescent girls.

**Nutrient intake:** The nutrient intake was calculated using food composition tables (Gopalan *et al.*, 2010) [2]. Mean intake of nutrient was compared with recommended dietary allowances (RDA). Nutrient intake was then expressed as percentage of RDA (ICMR, 2010) [2, 3] to assess the adequacy of the diet.

## Results

### Intake of various food groups

The nutritional status of any individual is directly affected by food intake. Men need a wide range of nutrient to lead a healthy and active life and these are derived through the diet that person consumed daily. The component of diet should be chosen so that it provides all the nutrient in adequate amount and in proper proportion (ICMR, 2010) [2, 3]. Intake of various food groups presented in Table-1.1.

The mean intake of cereals among the subjects was found to be 152.68±101.5 g/day, 168.02±98.24 g/day and 166.72±112.8 g/day in 10-12 year, 13-15 year and 16-19 year of age group respectively. It was 63.62%, 50.92% and 50.52% of the balanced diet suggested by RDI (2011) [13]. Intake of cereals was found to be lower than RDI.

Mean intake of pulses by subjects was found to be 26.63±26.86 g/day, 28.40±15.89 g/day and 38.56±20.72g/day in 10-12 years, 13-15 years and 16-19 years of age group respectively.

Mean intake of green leafy vegetables among subject was found to be 29.43±17.84 g/day, 28.64±16.82 g/day and 31.23±11.25 g/day in 10-12 years, 13-15 years and 16-19 years of age group respectively, which was deficient by 60%, 57.03% and 55.77% of RDI in the age group of 10-12 years, 13-15 years and 16-19 years respectively. This may be attributed to low preference for green leafy vegetables by study subjects

**Table 1:** Mean food intake of adolescent girls

Age group	Cereals and millets	Pulses	Milk and milk products	Roots and tubers	Green leafy vegetables	Other vegetables	Fruits	Sugar	Fats/oil
	g	g	ml	g	g	g	g	g	g
<b>10-12 year</b>									
RDI	240	60	500	100	100	200	100	30	35
Mean	152.68	26.63	205.65	68.56	29.43	69.82	20.56	19.82	20.52
SD	101.5	16.86	121.6	25.6	17.84	12.82	11.29	8.88	8.93
% of RDI	63.62	44.38	41.13	68.56	29.43	34.91	20.56	66.07	58.63
% deficient	36.38	55.62	58.87	31.44	70.57	66.09	79.44	33.93	41.37
<b>13-15 year</b>									
RDI	330	60	500	100	100	200	100	25	40
Mean	168.02	28.4	228.86	65.42	28.64	83.78	22.64	18.67	19.24
SD	98.24	15.89	162.5	36.92	16.82	15.38	12.82	12.82	6.83
% of RDI	50.92	47.33	45.72	65.42	28.64	41.89	22.64	74.68	48.1
% deficient	49.08	52.62	54.28	34.58	71.36	58.11	77.36	25.32	51.9
<b>16-19 year</b>									
RDI	330	75	500	200	100	200	100	25	35
Mean	166.72	38.56	225.63	96.56	31.23	85.68	20.69	19.82	20.83
SD	112.8	20.7	112.8	48.28	11.25	19.25	11.87	12.83	10.89
% of RDI	50.52	51.41	45.13	54.23	31.23	42.84	20.69	79.28	59.51
% deficient	49.48	48.59	54.87	51.72	60.77	57.16	79.31	20.72	40.49

The consumption of roots and tubers among the subjects ranged from 10 to 150 g/day with a mean intake of 68.56±25.6 g/day in 10-12 years, 65.42±36.92 g/day in 13-15 years and 96.56±54.23 g/day in 16-19 years of age. The mean intake was deficient by 31.44%, 34.58% and 54.23% of recommended intake for the respective age group.

The consumption of fruits was found to be 20.56±11.29 g/day, 22.64±12.82 and 20.69±11.82 g/day in the age group of 10-12 years, 13-15 years and 16-19 years respectively, which was nearly one fourth of balanced diet (100 g/day).

The mean intake of milk and milk products was found to be 205.65±12.6 mg/day, 228.86±162.5 mg/day and 225.63±112.8 mg/day among all the three groups' viz. 10-12 years, 13-15 years and 16-19 years of age. This was nearly half of the balanced diet (300 g/day). Mostly adolescent girls were

not consumed milk in their diet.

Fats were used by all the families in the preparation of food. Mean intake of fat by the subject was 20.52±8.93 g/day, 19.24±6.83 g/day and 20.83±10.89 g/day in the age group of 10-12 years, 13-15 years and 16-19 years respectively. Intake was almost 50-60% in comparison with the suggested quantity.

### Nutrient intake by the subjects

The mean intake of energy among 10-12 year of age was 1205±236.52 kcal/day, 13-15 year of age was 1355.5±242.60 kcal/day and 16-19 year of age was 1426.5 ±383.77 kcal/day respectively. Energy intake was deficient by 40.05%, 41.82%, and 41.54% of RDA in the age group 10-12 years, 13-15 years and 16-17 years respectively. Majority of subjects had

energy intake less than 60%. This may be because more than 50% girls skipped their breakfast regularly and 10-20% girls skipped their meal mainly at night.

Data in Table-1.2 indicate that the mean intake of protein was

60.89%, 63.05% and 54.95% of RDA in the age group of 10-12 years, 13-15 years and 16-19 years respectively. Majority of subject had protein intake less than 65%.

**Table 2: Mean nutrient intake of adolescent girls**

Age group	Energy kcal	Protein g	Fat g	Calcium mg	Iron mg	Vitamin-A µg	Thiamin mg	Riboflavin mg	Niacin mg	Vitamin-C mg	Carbohydrate g
<b>10-12 year</b>											
RDA	2010	40.4	35	800	27	600	1	1.2	13	40	301.5*
Mean	1205	24.6	19.5	386.05	10.8	290.82	0.49	0.59	7.4	26.24	163.45
SD	236.52	19.6	16.3	299.43	12.6	127.23	0.43	0.35	5.34	13.42	126.84
% of RDA	59.95	60.89	55.71	48.25	40	48.47	49	49.17	56.92	65.6	54.21
%deficient	40.05	39.1	44.19	51.75	60	51.53	51	50.83	43.08	34.4	45.79
<b>13-15 year</b>											
RDA	2330	51.9	40	800	27	600	1.2	1.4	14	40	349.5*
Mean	1355.5	32.7	21.5	392.91	11.6	320.65	0.61	0.68	7.9	25.83	183.43
SD	242.6	15.6	18.5	249.25	12.2	186.56	0.41	0.51	4.53	12.26	134.87
% of RDA	58.17	63.05	53.75	49.11	42.96	53.44	49.17	48.57	56.43	64.58	52.48
%deficient	41.82	36.99	46.25	50.88	57.03	46.56	50.53	51.42	43.57	35.42	47.51
<b>16-19 year</b>											
RDA	2440	55.5	35	800	26	600	1	1.2	14	40	366*
Mean	1426.5	30.6	20	402.35	11.5	309.42	0.5	0.64	8.2	27.72	199.8
SD	383.77	16.5	18.6	256.63	9.2	126.62	0.46	0.56	6.42	11.42	124.5
% of RDA	58.46	54.95	57.14	50.29	44.23	51.7	50	53.33	58.57	69.3	54.59

The intake of calcium was found to be 386.05±299.43 mg/d in 10-12 year of age group, 392.91±249.25 mg/d in 13-15 year of age group and 402.35±153.63 mg/d in 16-19 year of age group respectively. Intake of calcium was less respectively to RDA. It was deficient by 51.75%, 50.88% and 49.70% of RDA in the age group of 10-12 years, 13-15 years and 16-19 years respectively (Table-4.7). It may be due to low inclusion of calcium rich food in daily diet and majority (75%) of subject included tea in morning.

The mean iron intake by the respondent was 10.8±12.6 mg/d, 11.6±12.2 mg/d and 11.5±9.2 mg/d in 10-12 year, 13-15 year and 16-19 year of age group respectively. The mean values were lower than the recommended allowance due to very low intake of green leafy vegetable and iron rich dietary sources in their daily diet. It was deficient by 60%, 57.03% and 55.77% of RDA in the age group of 10-12 years, 13-15 years and 16-19 years respectively.

## Discussion

Poor nutritional status during adolescence is an important determinant of health outcomes. Short stature in young people due to chronic malnutrition is associated with reduced body weight and lack of muscle strength and work capacity.

Result of this food intake can be supported by the study conducted by Malhotra and Passi (2006) [4], they reported that the mean daily intake of milk and milk products, pulses, green leafy vegetables, other vegetables and fruits was grossly inadequate meeting only 47%, 36%, 26%, 34% and 3% of the recommended allowances. The study also reveals that not only a high incidence of under-nutrition is found but also an inadequate energy and micronutrients intake among the beneficiaries of adolescent girl's scheme.

NNMB survey (2012) reported that the mean intake of cereals and millets was 220 g/day, 324 g/day and 346 g/day among the adolescent girls of 10-12 years, 13-15 years and 16-19 years of age respectively. The average intake of pulses and legume was 25 g/day, 27 g/day and 29 g/day in 10-12 year, 13-15 year and 16-19 year of age respectively, which was less than the suggested RDI.

Majority of subject had protein intake less than 65%. The

chief sources of animal protein in the Indian diet are limited to milk and its products, which are sometime unaffordable especially in families with large numbers of family members (joint families) and limited source of income (Mittal and Srivastava, 2006; Pant, 2008 and Sukchan *et al.*, 2010) [7, 8, 11]. Maliye *et al.* (2010) [5] reported that Majority of the adolescent girls (82.5%) of rural wardha had calorie intake less than 1400 kcal. 7.5% girls had calorie intake less than 1000 kcal. The average energy intake was 1239.6±176.4 kcal/day.

## Conclusion

In the present study, it was observed that the majority of the adolescents had regular enough number of meals and snacks, but intake of nutritious food such as milk, protein rich food, green leafy vegetables, and fruits was not enough according to ICMR standards.

The findings echo the lack of nutrition in teenage girls, which negatively affects nutrition. If poor nutritional status is not corrected immediately before conception, it will negatively affect reproduction. If we are to meet our reproductive and child health goals, intervention strategies are needed to improve the diets of adolescent girls to meet their energy, protein, vitamin, and mineral needs.

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