

NUTRIENT INTAKE AMONGST ADOLESCENT GIRLS BELONGING TO POOR SOCIOECONOMIC GROUP OF RURAL AREA OF RAJASTHAN

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ABSTRACT

Objective: To assess the nutrient intake of adolescent girls belonging to low socio-economic group of rural Rajasthan. **Design:** Cross-sectional, using probability proportionate to size, cluster sampling method. **Setting:** 18 villages of Jaipur district. **Subjects:** 941 adolescent girls of age 10-18 yr. **Methods:** Anthropometric measurements for height, weight, mid-upper arm circumference, triceps skin fold and chest circumference; 24 h recall method to assess nutrient intake. Nutrient intake was compared with Indian Council of Medical Research recommended dietary allowances. **Results:** The diets were deficient in calories by 26 to 36%, and in proteins by 23 to 32%. Nutritional status as assessed by body mass index revealed that 8.1% of adolescent girls suffered from chronic energy deficiency (CED) grade I, 6.6% grade II CED, and 78.8% grade III CED. About 73.7% of subjects suffered from anemia and 43.6% had signs of vitamin B complex deficiency. **Conclusions:** Intervention strategies are needed to improve the dietary intake of adolescent girls so that their requirements of energy, protein, vitamins and minerals are met.

Key words: Adolescent girls, Nutritional status, Nutrient intake, Dietary recall.

ADOLESCENCE is a period of peak growth for boys and girls(1). Nutritional requirements in relation to body size are more during adolescence(2). In a country like India with varying social customs and common beliefs against females there is a high prevalence of malnutrition amongst girls. High severe malnutrition amongst girls has been reported from West Bengal (3) and Punjab(4).

The nutritional status which is often poor during early life gets worsened as the adolescent growth spurts occurs(5). Girls in rural areas get married early.

Adolescent mothers belonging to poor socioeconomic strata suffer more because chronic under-nutrition retards skeletal growth and maturation. Adolescent girls with height <145 cm and weight <38 kg are at risk for delivering low birth weight babies(6).

Studies on diet surveys have shown that the diets of low income group population are inadequate when compared to recommended standards(7-10). The common causes of malnutrition among adolescents in the poor community are less access to

food and inadequate knowledge about dietary requirements(11). No study has been conducted on adolescent girls belonging to poor communities of Rajasthan to determine their nutrient intake and nutritional status. The present study was conducted to fill this gap in the knowledge.

Subjects and Methods

The study was conducted in a rural area of Rajasthan. From the Census Division a list of all districts with more than 20% of the Scheduled Caste (SC) population was obtained (12). Using simple random sampling procedure one district (Jaipur) was selected for the purpose of detailed study. The district comprised 101 villages. All those villages with SC population more than 20% and above and within 20 km radius from the district headquarter were selected for the study, keeping in view the operational feasibility. Using the probability proportionate to size cluster sampling method, a total of 941 adolescent, girls were selected for the study.

All adolescent girls aged 10-18 yr, who were apparently healthy, were included in the study. Subjects with physical deformities or history of chronic illness were excluded. The adolescent girls attending the schools were interviewed and examined for nutritional deficiency disorders. Adolescent girls who were not attending schools were covered by domiciliary visits.

The identification data for each of the selected girl included information on family income, family size, birth order, education and occupation of parents. Information was also collected on age, educational, occupational and marital status, age at menarche and dietary intake of the adolescent girl. The height, weight, chest circumference, mid-upper arm circumference (MUAC) and triceps skin fold thickness (TSF) were measured using standard techniques(13).

Dietary intake was assessed by 24-hr recall method using an oral questionnaire for 2 consecutive days. Care was taken to avoid fasting and festival days while noting the intake. The nutrient intake was calculated using tables of Nutritive Value of Indian foods(14). To further validate the 24-hr nutrient intake data, the consumption of major food items was assessed using food frequency method.

Results

A total of 941 adolescent girls aged 10-18 yr were assessed for nutrient intake in 18 villages of Jaipur district during July 1992 to February 1993. The mean age of the subjects was 12.9 ± 3.0 yr. All subjects belonged to the socioeconomic group with a mean per capita monthly income of Rs. 27.2 ± 7.7 . Majority of the girls (60.3%) belonged to the joint family system.

The age-wise distribution of adolescents according to their anthropometric measurements is given in *Table I*. It was observed that the mean height of adolescent girls at 13, 15 and 17 yr was 148.1 ± 7.3 cm, 152.2 ± 7.3 cm and 154.1 ± 5.9 cm respectively. The mean body weight of adolescent girls at 13, 15 and 17 yr was found to be 34.1 ± 5.8 kg, 37.8 ± 5.1 kg and 40.7 ± 5.1 kg, respectively. It was observed that the mean MUAC was 21.6 ± 2.0 cm, 22.8 ± 2.2 cm and 23.6 ± 2.4 cm for 13, 15 and 17 yr respectively. The mean TSF was 8.2 ± 2.4 mm, 9.7 ± 3.3 mm and 9.4 ± 1.9 mm for 13, 15 and 17 yr respectively. The mean chest circumference was 71.6 ± 6.1 cm, 76.1 ± 5.4 cm and 76.6 ± 6.5 for 13, 15 and 17 yr adolescent subjects respectively.

The BMI defined as weight (kg)/height² (m) was used to assess the nutritional status of adolescent girls. Adolescents with BMI values less than 18.5 were

TABLE I—Distribution of Adolescent Girls According to their Anthropometric Measurements (n=941)

Age (yr)	N	Height Mean ± SD (cm)	Weight Mean ± SD (kg)	BMI Mean ± SD (kg/m ²)	MUAC Mean ± SD (cm)	TSF Mean ± SD (mm)	Chest Circumference Mean ± SD (cm)
10	187	128.93 ± 7.46 (187)	22.34 ± 3.91 (187)	13.36 ± 1.58 (187)	18.14 ± 1.59 (187)	6.51 ± 1.73 (185)	59.99 ± 5.54 (186)
11	135	135.24 ± 7.74 (135)	25.26 ± 4.16 (135)	13.75 ± 1.53 (135)	19.06 ± 1.88 (135)	7.18 ± 1.67 (134)	62.51 ± 7.12 (135)
12	158	141.09 ± 7.30 (158)	28.09 ± 5.00 (158)	14.02 ± 1.60 (158)	19.89 ± 1.91 (158)	7.24 ± 1.66 (156)	65.87 ± 5.02 (158)
13	129	148.02 ± 7.18 (129)	34.09 ± 5.81 (129)	15.47 ± 1.91 (129)	21.59 ± 1.99 (129)	8.21 ± 2.39 (128)	71.61 ± 6.08 (129)
14	91	151.32 ± 5.86 (91)	36.71 ± 4.69 (91)	15.99 ± 1.59 (91)	22.38 ± 2.01 (91)	8.66 ± 3.02 (90)	74.07 ± 5.46 (91)
15	98	152.18 ± 7.26 (98)	37.82 ± 5.14 (98)	16.30 ± 1.72 (98)	22.81 ± 2.16 (98)	9.67 ± 3.34 (97)	76.08 ± 5.40 (98)
16	56	154.94 ± 5.71 (56)	40.79 ± 6.19 (56)	16.94 ± 2.09 (56)	23.68 ± 2.43 (56)	9.92 ± 3.76 (55)	77.81 ± 6.61 (56)
17	31	154.07 ± 5.89 (31)	40.73 ± 5.13 (31)	17.16 ± 2.08 (31)	23.59 ± 2.42 (31)	9.42 ± 1.87 (30)	76.64 ± 6.50 (30)
18	56	153.43 ± 6.91 (56)	40.81 ± 4.38 (56)	17.35 ± 1.79 (56)	23.91 ± 1.80 (56)	9.87 ± 2.85 (55)	78.71 ± 7.11 (56)

Figures in parentheses indicate total number of subjects in that particular category.

considered to be stiffening from chronic energy deficiency (CED). The CED was further classified into various degrees: first (17-18.5), second (16-17) and third (below 16)(15). 73.7% of subjects suffered from anemia and 43.6% had B-complex deficiency. The mean age at menarche was 13.7 ± 3.6 yr.

The subjects were categorised into three groups: 10-12 yr (Group A), 13-15 yr (Group B) and 16-18 yr (Group C) for nutrient intake. The nutrient intake was compared to Recommended Dietary Allowance (RDA) laid down by the Indian Council of Medical Research, 1993 (*Table IT*). The mean calorie consumption per day was 1246.0 ± 410.8 Kcal, 1363.6 ± 404.7 Kcal and 1521.3 ± 413.5 Kcal for group A, B and C

respectively. The mean protein intake daily in Groups A, B and C was 40.1 ± 13.7 g, 43.7 ± 13.69 g and 48.4 ± 14.02 g respectively, as against the RDA of 57 g, 65 g and 63 g.

Discussion

Previous studies, among adolescent girls, have observed that the height, weight, MUAC, TSF and chest circumference values were significantly lower in those from the poor socioeconomic strata than the well-to-do group(16,17). National Nutrition Monitoring Bureau(18), also showed that the height, weight and growth rates of adolescents of low income group, were about 70-80% of those of well-to-do adolescents.

TABLE II—Mean Daily Intake of Nutrients by Adolescent Girls and its Comparison with Recommended Dietary Allowance (n=941)

Age (yr)	No.	Energy (Kcals)			Proteins (g)		
		Intake	RDA	% Deficit	Intake	RDA	% Deficit
10-12	480	1246.00 ± 410.82	1970	36	40.1 ± 13.78	57	29
13-15	314	1363.56 ± 404.69	2060	34	43.7 ± 13.68	65	32
16-18	147	1521.30 ± 413.50	2060	26	48.4 ± 14.03	63	23

In the present study, 76(8.07%) of subjects suffered from first degree of CED, 62(6.59%) suffered from second degree of CED and 741 (78.75%) suffered from third degree of CED. Only 62(6.59%) had BMI more than 18.5. When the nutrient intake of the subjects was compared with ICMR's Recommended Dietary Allowance (Table II), it was found that the calorie intake was deficient by 36%, 34% and 26% in Group A, B and C respectively; this could be mainly due to inadequate intake of food *per se*. The intake of proteins was deficient by 29%, 32% and 23% in the groups A, B and C respectively. Earlier diet surveys in Indian adolescent population have also shown that the diets are inadequate in all nutrients including iron, proteins, calcium and calories (2,19,20). In a recent study, nutrient intakes of rural adolescent were found to be below the RDA with the exception of protein(21). In the present study the adolescent girls had basically a cereal based diet. The intake of legumes, animal foods and vegetables including green leafy vegetables were also inadequate.

The growth spurt, in our subjects, was found between ages of 10 and 13 years inspite of chronic and severe PEM. Other reports also suggest that the difference observed in the age of menarche may not be related to the socioeconomic status. The present study revealed that the adolescent girls of rural Rajasthan have deficit in height and weight largely because of dietary insufficiencies. There is a need to initiate intervention measures to improve the nutritional status of adolescent girls who are the future 'mothers-to-be'.

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