ORIGINAL ARTICLE

A cross sectional study to assess nutritional status of adolescent girls at a government senior secondary girls' school at Bikaner, Rajasthan

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Citation

Abstract

Introduction: Even after introduction of Kishori Shakti Yojana and SABLA with existing ICDS still we are far lagging behind the goal to achieve optimum nutritional status of adolescent girls in our country, therefore an insightful study is needed to look into its causes. **Aim**: To evaluate the nutritional status of school going adolescent girls of 11-16 yrs of age group. **Objectives:** 1. To perform anthropometric assessment of adolescent girls by recording weight, height and BMI. 2. To assess the prevalence of anemia by Hb measurement. 3. To study dietary pattern among adolescent girls. 4. To assess mean age of onset of menarche 5. To find out association of independent variables with anthropometric measurements if there is any. **Materials and method: Study design**: cross-sectional school based study. **Study Place**: Govt. Sr. Sec. Girls' school, Bikaner, Study population: school going girls of 11-16 years age. **Study Duration:** 3 Months (July 2014-Sept 2014). Sampling method: Stratified random sampling, **Study tool:** pre-tested semi structured questionnaire **Data analysis**: SPSS16 software. **Results**: Among 240 adolescent girls studied, their age ranged from 11-16 years, including 40 participants from each year age. Mean age of onset of menarche was 12.68±0.917 years. Mean height & Mean weight were 136.8 cm & 28.64 kg respectively whereas mean BMI was 15.244. Presence of anemia was statistically significantly associated with age (p<0.05) and BMI (p<0.001). A positive correlation was observed between level of Hb and BMI (r=0.87). Daily calorie intake was observed to be positively correlated as well as significantly associated with BMI of participants. **Conclusion:** Adolescent girls' nutrition still remains our major public health problem; there should be more vigorous efforts to its control as well as prevention

Key Words

Adolescents; Nutritional Status

Introduction

Adolescent girls, constituting nearly one tenth of Indian population, are the worst sufferers of the ravages of various forms of malnutrition because of their increased nutritional needs and low social power (1).

Adolescent girls need special care in view of their role in shaping the health and well-being of the present as well as future generations. However, in India, young girls are sadly neglected and most of them reach adolescence through years of poverty, illiteracy, ignorance and lack of adequate nutrition/health care. The ill effects of these deprivations are further aggravated by gender discrimination both at house hold and community level. This results in a poor nutrition, poor health status, besides a low social status of these girls. The girl child faces many challenges in developing countries including India. National family Health Survey revealed that girls were breast fed far shorter periods than boys, they are less likely to be vaccinated than boys and consistently less likely to receive treatment for diarrhea, fever and respiratory tract infections. Malnutrition is common among them and with the onset of menarche an average

Indian girl becomes highly susceptible to anemia. With such health conditions, a large number of girls are pushed into early marriages and that leads to early pregnancy and low birth weight babies who further accounts for malnutrition among infants and under five children. So, it is obvious that special attention should be given to the adolescent girls.

Dietary requirements for girls increase during adolescence because of pubertal growth and menarche (2). Nutrient needs parallel the rate of growth, with the greatest nutrient demands occurring during peak growth velocity (3). At the peak of growth spurt, the nutritional requirements may be twice as high as those of the remaining period of adolescence (4). However, malnutrition has been observed among many adolescent girls in developing countries (5). Ahmad, et al., (2004) in their study of nutritional status of adolescent school students in Lucknow district, observed that regarding energy, protein, iron and calcium intake/day in all the three age groups, daily intake was less than RDA as per ICMR guidelines in most of the girls (6).The Government of India now recognized adolescent girls as a separate and crucial target group and introduced many schemes for their betterment.

Even after introduction of Kishori Shakti Yojana and SABLA with existing ICDS and Many non-governmental organizations (CHETNA, PRERNA etc.) still we are far lagging behind the goal to achieve optimum nutritional status of adolescent girls in our country, therefore we conducted a insightful study to evaluate the nutritional status of school going adolescent girls of 11-16 yrs of age group. We selected school as our study places as the school going girls are easily accessible and also receptive.

Aims & Objectives

1. To perform anthropometric assessment of adolescent girls by recording weight, height and BMI.
2. To assess the prevalence of anemia by Hb measurement.
3. To study dietary pattern among adolescent girls.
4. To assess mean age of onset of menarche.
5. To find out association of independent variables with anthropometric measurements.

Material and Methods

It was a cross-sectional school based study and was conducted in the Government senior secondary girls' school, Udairamsar, Bikaner. Udairamsar is the Rural Health and Training center and field practice area of Community Medicine Department, SPMC, Bikaner. Permission from the Ethical committee and school principal were taken prior to the study. Girls between 11-16 years who were present at the time of study and who gave consent were included in the study. Sample size was 240. From each age group 40 girls were selected using stratified random sampling. A semi structured questionnaire was used to find out information about Socio- demographic profile, Dietary intake and onset of Menarche. Information on actual Age was taken from school records. Dietary intake was assessed by 24hr recall method using an oral questionnaire for 2 consecutive days. Care was taken to avoid fasting and festival days while noting the intake. The intake of energy & protein were calculated using the Nutritive Value of Indian foods and evaluated using Indian council of medical research recommended dietary allowance (ICMR-RDA) (7). Anthropometric measurements like Height and Weight were taken using standardized equipments and by standard technique (WHO 1995). The weight was measured in kilograms without shoes using a standing weighing machine having a precision of 0.5 kg. Checks on the scales were made routinely before recording the weight of each girl student and the pointer was adjusted to zero using the screw provided. The height was taken barefooted in centimeters using standard measuring tape. A vertical tape fixed perpendicular to the ground on the wall was used as the scale. This tape was non stretchable; was fixed with transparent adhesive tape and care was taken to see there was no fold or tilting to any side. Height was recorded to the nearest 1cm.

Body Mass Index was computed using internationally accepted formula as BMI= Weight (Kg)/ Height (m2). Nutritional status was assessed using age and sex specific cut off points of BMI. One-way ANOVA was performed to test for age difference in means of weight, height and BMI. Hb estimation, blood samples were taken and with help of Sahli's hemoglobinometer, measurements were done at RHTC, Udairamsar. Hb below 11.5 gm/dl was taken as the cut off value for 11-12 years of age group and below 12 gm/dl for 13-16 years of age groups. All statistical analyses were done using SPSS 16 software and statistical significance was set at $p < 0.05$.

Results

Mean height of study population ranged from 136.79 to 151.52 cms, Mean weight from 28.50 to 42.80 kgs and BMI from 15.2 to 18.6. It is clear from table 1 that there is a steady increase in weight and height with age. There were significant age difference in weight (F= 104.12, P=0.000), Height (F=77.56, P=0.000) and BMI (F=48.12, P=0.000). Out of 240 adolescent girls 169 (70.4%) had their BMI below 18.5 and only 29.6% had their BMI above 18.5. It is clear from table 2 that in age 11 and 12 years not even a single adolescent girl had their BMI above 18.5. The difference in BMI according to age was statistically significant (χ^2 =117.4, df=5; p=0.0001).

Among all adolescent girls 83 (34.5%) were anemic. Presence of anemia was significantly (χ^2=17.33, df=5; p=0.004) associated with age. It is clear from table 3 that there was a steep increase in prevalence of anemia from 13-14 years age group which can be contributed to their mean age of onset of menarche i.e. 12.68±0.917 years.

Adolescent girls' Hb level and BMI were found to be positively correlated (r=0.87).

Table 4 shows that daily mean intake regarding energy and protein among 11-13 years age group was 1398.53 kcals and 33.1 gms respectively whereas among 14-16 years age group the daily mean intake came out to be 1530.6 kcals and 31.2 gms respectively which are less than the ICMR recommended dietary allowances. The percent deficit from RDA among study population varied from 25.6% to 29.01% and 41.9% to 52.0% for energy and protein respectively. There was a statistically significant difference (p<0.001) regarding average daily intake of energy and proteins.

Discussion

In present study we found that there were significant age difference in weight, height and BMI, Similarly De K et al (2013) (8) also observed in their study of nutritional status of girls aged 10-18 years of Salboni, Paschim Medinipur, West Bengal, India that a significant age difference existed for weight, height and BMI (P<0.001). In present study 70.4% adolescent girls were having their BMI below 18.5, similarly Choudhary S et al (1) reported that 68.52% of adolescents had BMI less than 18.5 in rural area of Varanasi. In the present study, it was observed that the daily intake of energy was less than the RDA as per ICMR guidelines in all age groups. There was statistically significant difference (p<0.001) with the RDA as per ICMR guidelines.

Mathur, et al.,(9) in adolescent girls in Mehrauli, Delhi, also had similar findings, that energy consumption in all age groups was lower than RDA. Similar findings were also observed by Chaturvedi, et al., (10) Saibaba, et al.,(11) Goyle, et al.(12) and Kaur, et al.(13) In the present study it was observed, that the percent deficit of protein intake from the RDA was the highest among 14-16 years old girls While Chaturvedi, et al.,(10) in their study among adolescent girls in Jaipur district observed that in all the three age groups there was a protein deficit of 23-29% than RDA. Ahmad et al (2004),(6) and Sachan B et al (2013) (14) in their studies of nutritional status of adolescent school students in Lucknow district, also observed that regarding energy, protein, iron and calcium intake/day in all the three age groups, daily intake was less than RDA as per ICMR guidelines in most of the girls.

Conclusion

Adolescent girls' under- nutrition still remains our major public health problem. Therefore it is essential to provide nutritional education to adolescent girls especially in rural areas and to the weaker sections of the society and to implement adolescent friendly health services at primary health care level with emphasis on nutritional counseling component. This will decrease the poorly nourished mothers in future, who are more likely to give to low birth-weight babies, perpetuating a cycle of health problems which pass from one generation to another.

Recommendation

There should be parent teacher meeting biannually regarding nutritional status of their adolescent girls so that they can be made aware about the nutritional requirement time to time and necessary action could be taken at the family level.

Limitation of the study

We have included only one school that may not be the representative of the whole population of adolescent girls in the community and we have not included adolescent boys in our study though they also susceptible to nutritional problems.

Relevance of the study

Our study results provides the evidence that after implementation of several nutritional programs the adolescent nutritional status has not improved much and there should be change in policies so that visible

effect could be seen in adolescent girl's nutritional status.

Authors Contribution

KC: designed the study, analyzed the data and interpreted the results. KS: Revised the work critically. AK: Final approval of work to be published.

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Tables

TABLE 1 AGE SPECIFIC HEIGHT, WEIGHT AND BMI OF STUDY SUBJECTS

Age (years)	Numbers	Mean Height ± SD	Mean weight ± SD	BMI±SD
11	40	136.79±4.48	28.5±3.36	15.2±1.15 (13.3-17.7)
12	40	141.32±5.10	32.02±3.36	16.06±1.10 (13.7-17.8)
13	40	144.31±5.08	34.32±3.69	16.49±1.41(14.00-18.90)
14	40	149.50±3.27	37.8±3.85	16.90±1.41(13.40-19.54)
15	40	150.36±3.64	41.85±3.3	18.43±1.04(15.50-20.80)
16	40	151.52±3.09	42.80±3.33	18.60±1.17(16.2-21.6)
ANOVA		F=77.56 P=0.000	F=104.12 P=0.000	F=48.12 P=0.000

TABLE 2 ASSOCIATION BETWEEN AGE OF ADOLESCENT GIRLS AND THEIR BMI

BMI	11 year	12 year	13 year	14 year	15 year	16 year
<18.5	40	40	35	33	9	12
=>18.5	0	0	5	7	31	28

{$X2$ =117.4, df=5; p=0.0001}

TABLE 3 STUDY OF ASSOCIATION BETWEEN AGE OF ADOLESCENT GIRLS AND PRESENCE OF ANEMIA

Anemia	11 year	12 year	13 year	14 year	15 year	16 year
Present	7	9	11	17	18	21
Absent	33	31	29	23	22	19

{$X2$ =17.33, df=5; p=0.004}

TABLE 4 DISTRIBUTION OF ADOLESCENT GIRLS BY AGE GROUP AND AVERAGE DAILY INTAKE OF ENERGY, PROTEIN (N=240)

	AgeGroup	Mean intake/day	RDA	% deficit from RDA	P value
Energy (K Cals)	11-13	1398.53	1970	29.01%	<0.001
	14-16	1530.6	2060	25.6%	<0.001
Protein (gms)	11-13	33.1	57	41.9%	<0.001
	14-16	31.2	65	52.0%	<0.001