

## Evaluation of dietary intake and food patterns of adolescent girls from Motihari town, Bihar

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### ABSTRACT

**Objective:** This was a cross-sectional study designed to collect information on dietary intake and food patterns of adolescent girls from different schools and intermediate colleges of Motihari town. **Methods:** Hundred samples were selected from both private and government schools and colleges. A pretested food frequency questionnaire and 24 hour dietary recall was used to collect information on food intake and meal pattern. Average daily nutrient intake of adolescent girl were calculated and compared with recommended dietary allowances (RDA) for Indian.

**Results:** Average daily dietary intake of adolescent girls was found significantly lower when compared with RDA. Cereals were mainly consumed by subjects and are the main source of energy. Daily consumption of milk and milk products was very low and only 39% girls take it on daily basis. **Conclusion:** Results indicated an overall poor nutritional status among adolescent girls of Motihari town. A very high incidence of under-nutrition was seen among these girls. Nutritional and health professional are required to educate and encourage these adolescent to improve intake of milk and milk products, fruits and green leafy vegetables. This will help in preventing the disease associated with poor nutrition.

**Keywords:** Adolescent girl, dietary pattern, dietary intake, food frequency questionnaire, recommended dietary allowances.

### Introduction

Adolescent girls are the very important section of our society. Proper growth of adolescent girls is very important as they constitute one tenth population of a country. According to World Health Organization (WHO) about 1/5<sup>th</sup> of the world consist of adolescents, during this period good nutrition is very important for their proper physical growth and cognitive development. Nutritional status of adolescent girls

influences both the growth of nation as well as the growth of remaining population. Adolescence is a period of rapid growth phase which needs special nutritional requirements because 20% growth happens in stature and 50% growth happens in adult bone mass. Both physiological and psychological changes take place during this period. According to WHO (2005) 1200 million adolescent populations between 10 to 19 years of age are present in world and out of which 19% faces a series of nutritional challenges. These nutritional challenges not only affect their growth and development but also effect the growth of nation. Balanced diet is highly required to fulfill all these increased requirements. Diet of adolescent girls is highly influenced by dietary practices, cultural traditions and meal patterns [1]. Various internal and

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external factors such as food preference and availability, body weight perception and parental and peer influences the eating pattern of adolescent [2]. Cereals based food is mainly consumed in our country and consumption of pulses and animal foods is low. Negligence of nutritional needs of adolescent girls is also seen in India [3]. Various food tabs and taboos present in society affect their diet and food habits also changes in young girls due to lack of time as they spend more time away from home due to social and community activities, school and college [4]. Skipping breakfast is also more seen in females than males [5]. Poor nutritional status during adolescence leads to health outcomes at a later stage of life. Irregular Eating pattern is of major concern as it can lead to chronic non communicable diseases like diabetes, obesity, high blood pressure, cardiovascular disease and cancer later in life [6] Thus it's very important to know the dietary habit and food pattern of adolescent girl as it is essential for planning and providing the comprehensive care. Therefore this study was done to understand the nutritional status of adolescent girls and their dietary practices and beliefs. The specific objectives of the present study were (a) to estimate nutrient intake of adolescent girls (b) to find out dietary habits and practices of study subjects.[7-11]

## Material and Method

**Table 1: Food habit and Dietary pattern of adolescent girls**

Sr. No.	Particulars	Adolescent girls	
		N= 100	%= 100
1.	<b>Food habit</b>		
	Vegetarian	45	45
	Non-vegetarian	35	35
	Eggitarian	20	20
2.	<b>Dietary pattern</b>		
	Breakfast+Lunch+Dinner	85	85
	Breakfast+Lunch+Evening tea+Dinner	10	10
	Breakfast+Mid-morning+Lunch+Evening tea+Dinner+ Bed time	5	5

Food frequency questionnaire given in Table 2 shows 90 to 100 percent subjects with frequent consumption of cereals, pulses, vegetables and sweets. Frequent consumption of fruits (40 percent), milk and milk products (50 percent) and poultry (15 percent) was not seen in adolescent girls. Half of the adolescent population was never consuming any animal products.

Adolescent girls of age 13 to 18 years were selected in this cross-sectional study. A total of 100 adolescent girls were selected from private schools and intermediate colleges of motihari town. Two questionnaires were made which include a food frequency questionnaire (FFQ) and a 24-hour dietary recall. These questionnaires were filled in a personal interview and dietary intake data was calculated on all food items and beverages. Food consumption frequency was recorded in terms of cereals, pulses, milk and milk products, green leafy vegetables (GLV), roots and tubers, fruits, meat and poultry, fat and oils and sugars. The average daily nutrient intake was calculated with the help of the food composition tables of Gopalan. In addition to questionnaire food habit and dietary pattern e.g. the consumption pattern of breakfast, lunch and dinner was also recorded.

## Result

The age range of adolescent girls was from 13 to 18 years. As shown in Table 1 maximum respondents were vegetarian (45 percent) and remaining are with other food habits. Dietary pattern of subject shows maximum respondents (85 percent) with a dietary pattern of breakfast+ lunch+ dinner.

The average daily consumption of food groups by the adolescent girls of 13 to 15 years and 16 to 18 years was shown in Table 3. Consumption of all the food groups in adolescent girls was very low than the suggested amount. Cereals were mainly consumed and were the main source of energy among girls of Motihari.

Table 2: Frequency of consumption from each food group by the adolescent girls

Food groups	Frequent consumption			Infrequent consumption			
	D % (n)	4-6x/wk % (n)	Total % (n)	<3x/wk % (n)	O % (n)	Never % (n)	Total % (n)
1. Bread and cereals	100(100)	-	100(100)	-	-	-	-
2. Pulses	75(75)	15(15)	90(90)	10(10)	-	-	10(10)
3. Vegetables	80(80)	20(20)	100(100)	-	-	-	-
4. Fruits	25(25)	15(15)	40(40)	20(20)	40(40)	-	60(60)
5. Milk and milk products	39(39)	11(11)	50(50)	35(35)	15(15)	-	50(50)
6. Meat, fish and poultry	5(5)	15(15)	20(20)	20(20)	15(15)	45(45)	80(80)
7. Soft drinks, sweets and beverage	80(80)	15(15)	95(95)	5(5)	-	-	5(5)

D: Daily, n: total number of respondents, 4-6x/wk: 4-6 times per week, O: occasionally, <3x/wk: less than three times per week.

Table 3: Average daily consumption of food groups by adolescent girls

Food groups	Adolescent girls		t-value	p-value
	Age (13-15 years) n=35	Age (16-18 years) n=65		
Cereals	249.0±2.50	298±13.45	28.47	<0.0001
Pulses	29.87±1.89	32.67±6.56	3.202	<0.0001
Green leafy vegetable	18.78±1.49	25.67±4.65	10.95	<0.0001
Roots and tubers	34.89±3.56	35.89±6.67	0.971	<0.0002
Other vegetables	15.67±2.45	19.48±5.64	4.681	<0.0001
Fruits	12.87±3.23	6.78±4.53	7.773	0.034
Milk and milk products	145.67±5.56	153.86±15.45	3.837	<0.0001
Fats and oils	15.56±3.32	16.67±1.99	1.811	0.0004
Sugar and jaggery	6.67±6.56	5.78±1.17	0.795	<0.0001
Animal products	25.89±0.67	29.78±1.76	15.82	<0.0001

Table 4 and 5 shows the average daily nutrient intake of adolescent girls in age group 13 to 15 years and 16 to 18 years. Among adolescent girls in the age group 13 to 15 years the average intake of calories (1258.2kcal/d), protein (38.14 g/dl), calcium (424.12mg/dl), iron (19.78mg/d), carotene (1136.90µg/d), thiamin (1mg/d), vitamin C (35.17mg/d) and riboflavin (1.2mg/d) were very lower than the RDA. A highly significant difference was seen in between the average daily intake and RDA of adolescent girls for all the nutrients except thiamine and

riboflavin. Among another group of adolescent girls in the age group of 16 to 18 years the average daily nutrient intake of calories (1534.52kcal/d), protein (42.17g/d), calcium (412.77mg/d), iron (19.83mg/d), carotene (1199.3µg/d), thiamin(0.86mg/d), riboflavin (1.33mg/d), vitamin C (65mg/d) were less than the I.C.M.R R.D.A. Again a highly significant difference was seen in the nutrients intake and RDA of adolescent girls in between all the nutrients.

Table 4: Average daily nutrient intake of adolescent girls (13-15 years)

Group	Particular	Calories (kcal)	Protein (g)	Calcium (mg)	Iron (mg)	Carotene (µg)	Thiamin (mg)	Vitamin C (mg)	Riboflavin (mg)
13-15 (years) N=35	Average intake	1258±8.97	38.14±2.56	424.12±1.33	19.78±0.09	1136.90±12.04	1.0±0.02	35.17±3.24	1.2±0.06
	RDA	2060	65	600	28	2400	1.0	40	1.2
	Difference	-801.75	-26.86	-175.88	-8.22	-1263.1	-	4.83	-
	t-value	528.95	62.07	782.34	540.33	620.64	0.0000	8.81	0.0000
	p-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	=1.000	<0.0001	=1.000

Table 5: Average daily nutrient intake of adolescent girls (16-18 years)

Group	Parameter	Calories (kcal)	Protein (g)	Calcium (mg)	Iron (mg)	Carotene ( $\mu$ g)	Thiamin (mg)	Vitamin C (mg)	Riboflavin (mg)
16-18 (Years) N=65	Average intake	1534.52 $\pm$ 5.67	42.17 $\pm$ 0.56	412.77 $\pm$ 4.78	19.83 $\pm$ 1.34	1199.3 $\pm$ 3.45	.86 $\pm$ 0.12	65 $\pm$ 5.64	1.33 $\pm$ 0.07
	RDA	2060	63	500	30	2400	1.0	40	1.2
	Difference	-525.48	-20.83	-87.23	-10.17	-1200.7	-0.14	+25	+0.13
	t-test	747.18	299.88	147.12	61.18	2805.89	9.40	35.73	14.97
	p-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

## Discussion

Period of adolescence is a period of greater energy and nutrients requirements. This period is marked by rapid and continuous physical and mental changes that transform a small child into a young girl. During this period consumption of insufficient diet can lead to slow growth [12, 13]. Improper diet and unsuitable food pattern can also result in diet-related chronic disease in adulthood [14]. In our study we can see that the average daily nutrients intake of adolescent girls is very low in comparison of RDA. Maximum respondents (85percent) follow a dietary pattern of breakfast+lunch+dinner which is not a proper dietary pattern for adolescents. The average daily consumption of food groups among adolescent girls of 13 to 15 years and 16 to 18 years is very less especially green leafy vegetables and fruits. Our study is similar with [15,16] who concluded that there was inadequate consumption of all food groups especially for green leafy vegetables, roots and tubers, fruits and milk among 500 adolescent girls (13-18 years) of Marathawada region. In present study the intake of milk and milk products, meat, fish and poultry was very low. Intake of pulses was also seen in only 75 percent on daily basis. This could be the main reason for energy and protein deficit in the diets. According to our FFQ more than half of the protein consumed by girls is obtain from plant source which include grain and legumes. Proteins found in these food groups are of low biological value. Whereas the consumption of protein with high biological values like red meat, fish, poultry, milk and milk products and egg were found to be low. Proteins from plant sources are not a good source of iron as they contain non-heme iron and also indigestible fiber present in them inhibit iron absorption. So adolescent who mostly depends on plant food have a high tendency of acquiring anemia due to lack of iron (Institute of medical science 2002).[10]

An average daily nutrient of girls was also very low when compared with RDA. These findings were similar with Parimalavalli and Sangeetha (2011) who concluded that the mean nutrient intake of the selected adolescent girls was less when compared with RDA. Tatia and Taneja (2003) [14] also studied the dietary intake of adolescent girls and found that consumption of cereals has 70 percent of RDA, whereas the pulses intake was only 25 percent of RDA. The intake of green leafy vegetable was very low while fruit intake was almost negligible. Various other scientists also found that the diets of adolescent girls were deficit in calories and other nutrients [17-20] Very low intake of energy might be the reason of high prevalence of underweight among these adolescent girls i.e. 56 percent.

## Conclusion

The overall nutritional status in semi-urban adolescent girls of Motihari is not satisfactory. Average daily nutrient intake of adolescent girls was very less in comparison of RDA. FFQ shows a very low consumption of milk and milk products, animal products and fruits. Hence the present study reveals a high incidence of under-nutrition and dietary inadequacy in respects of energy, protein and micronutrients. Result clearly shows a need for nutrition education program for female adolescent. Target of education should be on encouraging daily breakfast consumption and pulses. Education should be provided about nutritive values of various foods and making healthy food choices. Encouragement should be given to increase their fruits and vegetable consumption.

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