

Nutritional Status of Rural - Urban Adolescent Girls - A Comparative Study

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ABSTRACT

Adolescence is a transition period from childhood to adulthood and it is the nutritionally vulnerable group. During this period the development of healthy eating habits is of supreme importance. With this concern a comparative study was conducted among 200 adolescent girls (10-12 years), of government schools located at rural and urban areas of Bengaluru district to study dietary habits and nutritional status. Structured questionnaire was used to collect data. Information on dietary habits was elicited using questionnaire. Nutrient intake was computed and compared with RDA (Recommended Dietary Allowance). Anthropometric measurements such as height, weight and mid upper arm circumference (MUAC) was measured, indices were derived. Data was statistically analyzed. The findings indicated, the percent deficit for micro nutrients was more among urban respondents compared to rural. All the anthropometric measurements were significantly more among urban respondents compared to rural. Significant association of was found for energy ($r = 0.124^*$, $r = 0.016^*$), protein ($r = 0.047^*$) and calcium ($r = 0.081^*$) with anthropometric measurements. The poor dietary habits among adolescent girls responsible for insufficient nutrient intake in meeting RDA. This inturn has impact on nutritional status for which strengthening intervention strategies is most essential.

Keywords : Adolescence, Dietary habit, Anthropometry, RDA

ADOLESCENCE is ‘the period of life spanning the ages between 10-19 years (WHO-2012 and UNICEF-2005). Adolescence is a nutritionally vulnerable period, growth spurt and increasing in physical activity demands high nutritional and health needs (Ghai *et al.*, 2005) to support this rapid growth, teenagers need to consume lots of nutrients. During this period eating habits are established and during which adequate nutrition promotes healthy growth and health in adulthood. Nutritional status is an individual’s health condition as it is influenced by the intake and utilization of nutrients (Todhunter, 1970). The nutritional status of individual is usually a result of multiple factors that interact with each other at different levels. The consumption of adequate amount of food both in terms of quantity and quality is one of the key determinants, which has a significant impact on the nutritional status (Park, 2009). Identifying the role of diet is essential for assessing nutritional status of an individual, family and community are important public health concern. Anthropometric measurements can detect the change

of body composition to assess the nutritional status in specific population groups. It also suggests the patterns of growth and development of an individual (WHO 1995). Bengaluru is rapid urbanizing South Indian mega city. It was hypothesized that rural and urban adolescents are exposed to different factors which influence food consumption pattern determining nutritional status. Urban girls are influenced by level of socio-economic status and consumption of ready-made foods, industrially processed foods, which are low in vitamins, minerals and fiber. Hence, in the present research an attempt was made to study and compare nutritional status of adolescent girls located at rural and urban settings of Bengaluru.

METHODOLOGY

Study Area

The present study was carried out in four randomly selected government schools of rural (Bendigana halli and Vijayapura) and urban (Tindlu and Jakkur) localities of Bengaluru district.

Selection of Subjects

A total of 200 adolescent girls aged between 10 to 12 years (100 - rural and 100 - urban) studying in government schools were selected purposively for the study.

Development of Questionnaire

A semi structured interview questionnaire was prepared in accordance with the methodological procedure and in consultation with statistician to collect data.

Dietary Habit

The dietary intake of the subjects was assessed using 24 hours recall for 3 consecutive day using previously standardized cups, vessels, spoons, rubber ball and circular papers. Nutritive value of the diet was calculated and compared with ICMR 2010 RDA (Recommended Dietary Allowance) for Indians. The per cent food adequacy (Intake of each nutrient / Recommended allowances*100) was calculated and expressed in terms of percent excess or deficit.

Anthropometric Measurement

The anthropometric measurements *viz.*, height (Ht), weight (Wt) and mid upper arm circumference (MUAC) were measured. Body mass index (BMI) was calculated and classified according to World Health Organization, 2007.

Data Processing and Analysis

Data collected from the survey was consolidated and analyzed for statistical tests by using percentages, mean, standard deviation, chi square test, standard 't' test. Inferences were made from particular data under each theme then conclusions were drawn from the findings.

RESULTS AND DISCUSSION

Food Habits and Meal Pattern of Rural-urban Respondents

A dietary pattern is the quantity, variety or combination of different foods and beverage in a diet and the frequency with which they are habitually consumed. Information on dietary habits are presented in Table 1.

TABLE 1
Dietary habits of rural-urban respondents

Variables	n = 200			χ^2 value
	Rural %	Urban %	Total %	
<i>Food Habit</i>				
Vegetarian	4	8	6	1.42 ^{NS}
Non vegetarian	96	92	94	
<i>Frequency of consumption of non-vegetarian food</i>				
Daily	0	0	0	228.29 *
Once in a week	78	72	75	
Twice in a week	11	13	12	
Thrice in a week	7	3	5	
Bimonthly	0	4	4	
<i>Meal pattern</i>				
Two times	11	6	8.5	6.04 *
Three times	86	84	85	
Four times	3	10	6.5	
<i>Skipping of meals</i>				
Yes	23	13	18	4.67 ^{NS}
No	77	87	82	
<i>Meals Skipped</i>				
Break fast	17	12	23	8.13 *
Lunch	0	0	0	
Dinner	6	1	3.5	
None	77	87	82	
<i>Reasons for skipping meals</i>				
b) No time to eat / hurry to school	20	13	16.5	7.62 *
c) Lack of appetite	3	0	1.5	

*Significant at 5% level, **Significant at 1%,
NS: Non-significant

Majority of the adolescent girls both in rural (96%) and urban (92%) were non vegetarians by food habit. However, the frequency of consumption was limited to once or twice in a week and observed to be more in rural compared to urban adolescents ($\chi^2 = 228.29^*$). Majority of the adolescent girls in rural (86%) and urban (84%) had three meals per day. Meal pattern distribution exhibited significant difference between rural and urban ($\chi^2 = 6.04^*$). However, 17 per cent of rural and 12 per cent of urban girls responded for skipping their meals. It was observed that, mainly it was breakfast which is skipped by rural (17%) and urban (12%) subjects. This meal skipping

pattern was statistically significant between rural and urban girls ($\chi^2 = 8.13^*$). Respondents quoted no time to eat or hurry to school as the main reason for skipping meals. The two meal consumption pattern due to habit of skipping meal was predominant in rural, whereas snacking pattern in urban girls contributed to four meal consumption. Lunch was not skipped by any of the respondents as it was served in schools as part of government mid-day meal programme. Hurrying for school every day, made them to skip breakfast. Regular three meals was consumed by majority of the subjects was recorded by Kansagara *et al.*, 2018. Not enough time and a lack of appetite upon rising are the main reasons for skipping breakfast and adolescents incorrectly believe that skipping breakfast can help them control their weight (Affinita *et al.*, 2013.). Dietary habit is often influenced by several factors such as regional food habits, socio-economic status, age of the study subjects and environmental factors such as peer, media and neighbor influence etc.

Nutrient intake of Rural - Urban Respondents

The RDA suggested by ICMR, 2010 for age group 10-12 of adolescent girls was compared with actual

intake to derive per cent deficit and excess for each nutrient is presented in Table 2.

Among girls in 10-12 years it was observed that, except fat, intake of all the nutrients was deficit compared to RDA in both rural and urban girls. The average intake of energy, protein, calcium, iron, β -carotene, thiamine, riboflavin, folic acid vitamin-C was deficit by 26.86, 26.98, 31.87, 76.48, 49.06, 17, 53.33, 32.28 and 72.00 per cent among the rural respondents and that of urban it was 21.24, 17.87, 58.12, 87.29, 58.40, 14, 70, 43.64 and 69.75 per cent, respectively. Statistically significant difference was found with the intake of calcium (0.141*), β -carotene (0.81*), folic acid (0.59*) between rural and urban respondents. The intake of energy and fat was higher among urban respondents compared to rural girls. Consumption of junk foods rich in fat and energy might be contributory factors for excess intake of fat by urban respondents compared to rural. The micronutrient deficit food pattern or less consumption of green leafy vegetables and other vegetables was observed among the urban respondents compared to rural leading to higher deficit of iron, β -carotene, riboflavin, vitamin-C and folic acid.

TABLE 2
Mean nutrient intake among rural and urban respondents (10-12 years)

n = 200

Nutrients	RDA	Rural			Urban			't' test
		Actual intake		% deficit/ excess	Actual intake		% deficit/ excess	
		Mean	SD		Mean	SD		
Energy (Kcal/day)	2010	1470	290.96	-26.86	1583	348.72	-21.24	0.26 ^{NS}
Protein (g/day)	40.4	29.5	6.98	-26.98	33.18	5.40	-17.87	3.61 ^{NS}
Fat (g/day)	35	44.38	7.27	+26.8	50.39	25.29	+43.97	2.25 ^{NS}
Calcium (mg/day)	800	545	136.38	-31.87	335	87.30	-58.12	0.141 [*]
Iron (mg/day)	27	6.35	4.34	-76.48	3.43	6.29	-87.29	3.55 ^{NS}
β carotene (ig/day)	4800	2445	311.52	-49.06	1996	421.3	-58.40	0.81 [*]
Thiamine (mg/day)	1	0.83	0.24	-17	0.86	0.31	-14	3.61 ^{NS}
Riboflavin (mg/day)	1.2	0.56	0.22	-53.33	0.36	0.18	-70	1.13 ^{NS}
Folic acid (mg/day)	140	94.8	45.12	-32.28	78.9	38.97	-43.64	0.59 [*]
Vitamin C (mg/day)	40	11.2	7.80	-72.00	9.1	3.45	-69.75	0.16 ^{NS}

*Significant at 5% level, **Significant at 1%,NS:Non-significant;

RDA : Recommended dietary allowance - ICMR, 2010

The findings of the present study are almost similar to NNMB-2012 reports and study by Krushna Yadav & Revanna, 2017 and Deepa S. Patil & Vijayalakshmi, 2015. The results of the study are in line with findings of the study conducted among adolescent girls of Wardha (Deshmukh *et al.*, 2006). Consumption of ragi, rich in calcium by rural respondents in their daily diet compared to urban is the reason for higher intake of calcium among them. Slightly higher intake of iron, β -carotene, folic acid among the rural respondents compared to urban may be due to consumption of ragi, protective foods such as green leafy vegetables and other vegetables contributing to these nutrients.

Nutritional Anthropometry

Mean anthropometric measurements and indices of adolescent girls is as depicted in the Table (3). The mean height (148.7 ± 6.459 cm), weight (39.26 ± 6.99 kg), MUAC (18.55 ± 2.27 cm) of the rural respondents was lower than that of urban respondents 150.47 ± 5.24 cm 42.71 ± 6.40 kg, 20.12 ± 2.83 cm, respectively. The mean BMI of urban (19.62 ± 2.70) respondents was higher than that of rural (17.75 ± 3.19) respondents 't' value indicates statistically significant difference at five per cent for height (2.14*), weight (3.62**), MUAC (5.57**) and BMI (4.50**) between rural and urban respondents. The findings are contradictory to study by Patanwar, and Sharma, 2013. Similar findings on MUAC was recorded by Dasgupta *et al.*, 2010.

Distribution of adolescent girls based on Body mass index (BMI) is as presented in Fig. 1. Majority of rural (54%) and 62 per cent of urban respondents were normal followed by 37 and 22 per cent

underweight, 7 and 11 per cent overweight and 2 and 5 per cent obese, respectively. However, this difference between rural and urban is statistically non significant ($\chi^2 = 6.54$ NS). Similar observations were expressed in a cross sectional study on adolescent school girls by Punshi and Jambhulkar, 2018.

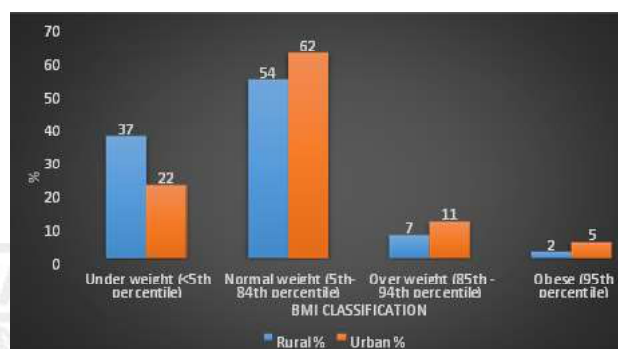


Fig. 1. Distribution of adolescent girls based on BMI classification

The high prevalence of under nutrition among rural girls could be attributed to social and economic disparities. But better nutritional status in urban girls may be attributed to the impact of better living conditions, medical facilities as well as early biological maturation. Consumption of non staple food items such as meat, egg, fruits, leafy vegetables etc were not frequent and less than RDA which might be the reason for the respondents lower intake of protein, calcium, vitamin A and other micro nutrients worsening the nutritional status.

Table 4 depicts the Correlation co-efficient between nutrient intake and anthropometric measurements of rural and urban respondents. Significant positive

TABLE 3
Mean anthropometric measurements and indices of adolescent girls

n = 200

Anthropometric measurements and indices	Rural		Urban		't' value
	Mean	SD	Mean	SD	
Height (cm)	148.7	6.45	150.47	5.24	2.14 *
Weight(kg)	39.26	6.99	42.71	6.40	3.62 **
Mid upper arm circumference(cm)	18.55	2.27	20.12	2.83	5.57 **
Body mass index (kg/m ²)	17.75	3.19	19.62	2.70	4.50 **

*Significant at 5% level, ** significant at 1%; NS: Non-significant

TABLE 4
Correlation co-efficient between nutrient intake and anthropometric measurements of rural respondents
n = 200

Nutrients	Height (cm)		Weight (kg)		MUAC (cm)		BMI (kg/cm ²)	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Protein (g)	-0.004	-0.004	0.128	-0.047	0.132	-0.056	0.047 *	-0.014
Fat (g)	-0.026	0.026	0.027	0.125	0.046	0.143	0.024	0.075
Carbohydrate (g)	-0.051	0.085	0.022 *	0.049	0.006 *	0.094	0.027	0.004
Energy (k cal)	0.043	0.112	0.124 *	0.016 *	0.105	0.044	0.017	0.023 *
Beta carotene (µg)	0.281	-0.039	0.32	0.016	-0.096	0.031	0.020	0.091
Calcium (mg)	0.081 *	0.032	0.135	-0.146	0.071	-0.160	0.105	0.059
Iron (mg)	0.20	-0.010	0.44	0.084	0.025	0.080	0.005	0.115
Thiamine (mg)	-0.140	-0.001	-0.84	0.120	-0.28	0.104	-0.108	0.158
Folic acid (mg)	0.061	0.022	-0.67	-0.056	-0.93	-0.080	0.004	0.059
Vitamin C (mg)	0.019	0.032	-0.032	0.051	0.040	0.022	0.321	0.433
Riboflavin (mg)	0.021	0.012	0.012	0.14	0.091	0.005	0.023	0.018

*Significant at 5% level, **Significant at 1%; NS:Non-significant

correlation was observed with protein intake and MUAC. Fat shown positive correlation all the variables except for height. A significant positive correlation was observed with intake of carbohydrate with weight and BMI ($r = 0.022^*$, 0.006^*) similarly weight showed significant correlation with energy and calcium with height of the respondents. However among the urban respondents protein showed negative correlation with anthropometric measurements and indices however positive correlation recorded with fat and carbohydrate intake. A significant positive correlation with energy with weight and MUAC ($r = 0.016^*$, 0.023^*)

The mean intake of all the food groups by rural and urban respondents of 10-12 year age was low compared to RDA, except for fat. Per cent deficit of all the micro nutrients was high among the urban respondents compared to rural respondents. The mean height, weight, body mass index, mid upper arm circumference (MUAC) of the urban adolescent girls was high compared with rural adolescent girls. affordability, accessibility and availability along with skipping of meals among the rural girls might be the reason for the findings. The consumption of nutrients was found to be positively correlated with

anthropometric measurements. Study revealed under nutrition was high (37%) among rural compared to urban (22%). The findings reiterate the dietary deficiency among adolescent girls which adversely affect anthropometric measurements in turn nutritional status of the adolescent girls, if the poor nutritional status is not corrected it adversely affect their reproductive out come in future for which intervention strategies to improve the dietary intake of adolescent are needed so that their nutrient requirement is met.

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