

Impact of Family Income on Physical Status, Dietary Pattern and Nutrient intake among Urban and Rural Adolescent

Dr. Zanvar Varsha¹, Bhojar Archana²

¹Assistant Professor, Shri Yoganand Swami Arts College, Basmat, Dist. Hingoli, India

²Assistant Professor, VNMM, Pusad, District Yeotmal, India

Abstract: Present study was carried out to find the impact of family income on physical status, dietary pattern and nutrient intake among urban and rural adolescent. Purposively 600 adolescent girl i.e.300 each from urban and rural area of Parbhani district of Maharashtra state was covered. Nutritional status was assessed by using anthropometric measurements viz. measurements of height (cm), weight (kg), mid- upper arm circumference (cm), waist- hip ratio and recorded measurements were compared with NCHS (1977) reference values. Body Mass Index was calculated using value of height and weight. Food intake was assessed by using 24 hours recall method for three consecutive days. Quantity of food stuff consumed by each subject was calculated by weightment method. By using food composition table of ICMR nutrient intake was calculated. Further food intake was compared with balanced diet and nutrient intake was compared with the (RDA) recommended dietary allowances for calculating the percent adequacy. The finding of study showed that all the covered subject were falling below the NCHS standard for all recorded anthropometric measurement in both area and age. Overall when observed the highest and lowest value for height and weight ranging between 92-96 per cent and 80-90 per cent when compared with NCHS standard with respect of all group. Middle income group recorded better value for all anthropometric measurement than low and high income group. Majority of adolescent girls were normal while remaining were suffering with one or more degree of under nutrition and over nutrition. The consumption of cereals, pulses, other vegetable and fruits was found to be more among 17 years of adolescent girls. On the other side consumption of roots and tubers, condiments and spices, milk and milk products and fats and oils was more among adolescent girls of 18 years. Whereas consumption of green leafy vegetable, nuts and oil seeds and sugars were at par. As per the ICMR recommendation food intake among three age groups was found to be below the recommendation. However the per cent adequacy of cereal, pulses, sugar and jaggery found to be maximum followed by fats and oil seeds. Further the mean intake of various nutrients were ranged as energy (1590.13 to 1695.45 kcal), protein (48.45 to 49.35g), fats (41.75 to 46.57g), iron (19.08 to 23.19 mg), calcium (373.61 to 502.18 mg), β -carotene (879.61 to 4725.54 μ g), thiamine (0.51 to 0.83 mg), riboflavin (0.68 to 1.14 mg), folic acid (154.33 to 184.27 mg), niacin (12.30 to 14.21 mg), Vitamin C (30.57 to 47.62 mg) and zinc (6.63 to 7.38 mg) respectively. While percent nutrient adequacy was found to be highest for fat, folic acid and vitamin C and lowest adequacy was noted for β - carotene and calcium.

Keywords: adolescent, family income, physical status, dietary pattern and nutrient intake

1. Introduction

Adolescent girls are very important section of our society as they are our potential mothers and future homemakers. Developmentally it is a crucial period, particularly with reference to reproductive health. The young women who are at the brink of womanhood constitute the most crucial segment of our population from the point of view of the quality of our future generation. It is a period of peak growth for boys and girls. Adolescence is a period of relatively good health with low prevalence of chronic disease.

The physiological changes of adolescence are referred to as puberty and their result is the capacity to reproduce. The process of puberty development is associated with marked changes in somatic development, accompanied by alteration in body compositions. The adolescent growth exhibits a maximum acceleration just before sexual maturation, reaches a peak between 12 to 14 years and declines gradually thereafter up to 18years, beyond which growth generally ceases. Basal metabolic rate is higher during adolescent periods than in adults. Sexual maturity occurs during this period with alteration in sex hormone secretion and metabolic changes.

During adolescence 20 per cent of final adult height and 50 per cent of adult weight are attained, bone mass increases of 45 per cent and dramatic bone remodeling occur, soft tissues, organs and even red blood cell mass increases in size. Nearly every organ in the body grow faster during this period which last about three years. Nutritional needs during this period are increased because of the increased growth rate and changes in body composition associated with puberty. Life styles and food habit changes which affects both nutrient need and intake. In general adolescent girls are worst sufferers of the ravage of various forms of malnutrition viz. Protein energy malnutrition, Iron, Iodine, Calcium, Vitamin A and other specific nutrient deficiencies because of their increased nutritional needs but decreased intake.

Adolescent's growth and development is closely linked to the diet they receive during childhood and adolescence. Adequate nutrition of any individual is determined by two factors. The first is the adequate availability of food in terms of quantity as well as quality which depends on socio-economic status, food practices, cultural traditions and allocation of the food. The second factor is the ability to digest, absorb and utilize the food in the body.

The adequate availability of food in terms of quantity as well as quality which depends on socio-economic status, food practices, cultural traditions and allocation of the food. Even where food resources are adequate, the mean caloric intake of individual family members can follow below requirements. Nutritional needs during this period are increased because of the increased growth rate and changes in body composition associated with puberty. Adolescents tend to eat differently than they did as children. Factors like the quest for independence and acceptance by peers, increased mobility and greater time spent at school/college and/or work activities and preoccupation with self-image that may affect adolescent's food choices. All these factors contribute to the erratic and unhealthy eating behaviours that are common among adolescents. So the present study was carried to find an impact of family income on physical status, dietary pattern and nutrient intake among urban and rural adolescent

2. Methodology

Purposively 600 adolescent girls of 16-18 years were selected from urban and rural area of Parbhani District. Further the sample was categorized into 300 from urban and rural area. Availability of adolescent girls was ascertained through visit to college, hostel and home. Information regarding socio economic background of selected adolescent girls was collected by personal interview method with a pre-planned questionnaire. The anthropometric status of selected adolescent girls was determined by recording height (cm), weight (kg) and Body Mass Index was calculated using value of height and weight. On the basis of Body Mass Index, adolescent girls were categorized into different grades of under nutrition. Food and nutrient intake of all 600 adolescent girls was assessed by using 24 hours recall method for three consecutive days. Quantity of food stuff consumed by each subject was calculated by weightment method. The amount of food consumed was measured using standardized weighing machines, spoons, glasses and plates for measurements of the raw foodstuffs. From the recorded weights of the raw foodstuffs; the food intake of selected adolescent girls was calculated. By using food composition table of ICMR nutrient intake was calculated. To calculate the percent adequacy, food intake was compared with balanced diet and nutrient intake was compared with the (RDA) recommended dietary allowances given by (ICMR, 1999).

3. Result

Anthropometric measurements of selected urban and rural adolescent girls in different family income

Table 1 exhibits anthropometric measurements of selected urban and rural adolescent girls in different family income. The mean height of urban adolescents in different income groups ranged from 154.69 to 155.12 cm. The height of adolescent girls in income group Rs. <10,000 did not significantly vary from the height of income Rs.10, 001 - 20,000 whereas height of adolescent girls in income group Rs. >20,001 reported 155.12 cm respectively. The weight of urban adolescent girls ranged from 44.67 to 45.87 kg with the lowest income group exhibiting the least value. This value did not exhibit any significant difference when

compared with immediately next income group. The body mass index was ranged from in income group Rs. 10,001 – 20,000 which recorded a mean value 19.16 kg/m². The mid upper arm circumference of urban adolescent girls did not exhibits significant difference when compared among three income groups. In case of hip circumference highest value was recorded for income group Rs. 10,001 – 20,000 with negligible difference with other income group. The waist circumference was ranged from 68.38 to 74.47 cm. The waist circumference of adolescent girls in income group Rs. <10,000 did not significantly vary from the waist circumference of income Rs.10, 001 -20,000 whereas waist circumference of adolescent girls in income group Rs. >20,001 reported 74.47cm respectively. In case of hip: waist ratio of urban adolescents in different income groups ranged from 0.88 to 0.94 with negligible difference among the tree income group.

In rural situation the height of adolescent ranged from 151.55 to 152.86 cm with low income group exhibits high value. This value did not exhibit any significant difference when compared with immediately next income group. The weight of adolescents in rural areas ranged from 45.39 to 45.89 kg respectively. The weight did not exhibit significant difference when compared among three income groups.

The body mass index of rural adolescent girls ranged from 18.86 to 20.10 kg/m² with the lowest income group exhibits highest value. The mid upper arm circumference of rural adolescent girls did not exhibits significant difference when compared among three income groups. The hip circumference of rural adolescent girls ranged from 80.34 to 81.84 cm respectively. Highest value recorded for hip circumference from high income group. Whereas in case of waist circumference and hip: waist ratio similar trend was observed. Statistically non-significant difference was noted as per area and different income group except for waist circumference in urban adolescent girls and BMI in rural adolescent girls.

Prevalence of under nutrition among selected urban and rural adolescent girl as per income group

Table 2 revealed the information on prevalence of malnutrition among selected urban and rural adolescent girls as per income group. From the table it is evident that as the income increased the per cent of normal girls increased from 44.54 to 55.84 per cent among urban and 62.50 to 70.15 among rural area. Whereas 8.84 to 12.98 per cent urban and 2.5 to 3.68 per cent rural girls were categorized as severely undernourished. Contrary among urban area as income increased per cent of mild and moderate girls were decreased. However same trend was not observed in rural area in case of moderate under nutrition girls.

Mean food intake of selected adolescent girls as per age

Mean food intake of selected adolescent girls as per age is described in Table 3. From the table it can be revealed that the consumption of cereals, pulses, other vegetable and fruits was found to be more among 17 years of adolescent girls. On the other side consumption of roots and tubers, condiments and spices, milk and milk products and fats and oils was more among adolescent girls of 18 years. Whereas consumption of green leafy vegetable, nuts and oil seeds and

sugars were at par. As per the ICMR recommendation food intake among three age groups was found to be below the recommendation. When critically seen about the consumption of different foods among 16 and 17 years of adolescent girls it can be concluded that except green leafy vegetable, roots and tubers and condiment and spices statistically significant difference was noted for cereals, pulses, other vegetables, nuts and oil seeds, fruits, milk and milk products, fats and oils and sugar and jaggery. Statistically significant difference was noted for cereals, other vegetables, condiment and spices, nuts and oil seeds, fruits, milk and milk products and fats and oils among 16 and 18 years adolescent girls. However when compared the 17 and 18 years of adolescent it was seen that except cereals, pulses, green leafy vegetable, nuts and oil seeds, fruits and fats and oils statistically significant difference was noted for roots and tubers, condiments and spices, milk and milk products and sugar and jaggery.

Per cent adequacy of food intake among adolescent girls as per age

Table 4 revealed the per cent adequacy of food intake by adolescent girls of different age groups. In all three age group the adequacy was maximum for sugar and jaggery (89.25- 99.26 %), fats and oils (78.86-80.12 %) and cereals (78.90 – 78.66 %) and minimum for roots and tubers (16.13-20.01%) and milk and milk products (16.90 -23.45 %). However per cent adequacy for pulses, green leafy vegetables, other vegetable, fruits found to be (57.92 - 64.90%), (30.45 – 33.53%), (21.29 – 28.99%), (27.12-36.30%) respectively.

Nutrient intake of selected adolescent girls as per age

Table 5 indicate that the mean nutrient intake of selected adolescent girls as per age. The mean intake of various nutrients were ranged as energy (1590.13 to 1695.45 kcal), protein (48.45 to 49.35g), fats (41.75 to 46.57g), iron (19.08 to 23.19 mg), calcium (373.61 to 502.18 mg), β -carotene (879.61 to 4725.54 μ g), thiamine (0.51 to 0.83 mg), riboflavin (0.68 to 1.14 mg), folic acid (154.33 to 184.27 mg), niacin (12.30 to 14.21 mg), Vitamin C (30.57 to 47.62 mg) and zinc (6.63 to 7.38 mg) respectively. The data revealed that among the studied three age groups recorded value for nutrient intake was more in 18 years adolescent girls for fat (46.47g), iron (23.19mg), calcium (502.18mg), β carotene (4725.54 μ g), riboflavin (1.14 mg), folic acid (184.27 mg), niacin (14.2 mg), vitamin C (47.62 mg). However intake of calorie (1695.45 Kcal), protein (49.35 g) and thiamine (0.83mg) was noticed maximum in 17years old adolescent girls and only zinc intake was recorded maximum among 16 years of adolescent girls. On the contrary when intake value compared with RDA except fats, folic acid and vitamin C remaining nutrients were found to be below than RDA. Compared between the age group it was noticed that 16 to 17 years old age group statistically significant difference was observed for energy, β carotene, thiamin, riboflavin, folic acid, niacin, vitamin C and zinc. When compared between intakes of nutrients among 16 to 18 statistically significant difference was observed for iron, calcium, β carotene, thiamine, riboflavin, folic acid. When consider the adolescent girls of 17-18 years statistically significant difference was exhibited for energy, fat, iron,

calcium, β - carotene, thiamin and vitamin C. However non-significant difference was noted for other nutrient intake.

Per cent adequacy of nutrient intake of adolescent girls as per income group

The influence of family income on per cent adequacy of intake of different nutrient is presented in Table 35. It is evident from the table that as the income of family increased, per cent adequacy of different nutrients also increased. Highest adequacy was noted for fat (120.56 to 128.38 %) followed by folic acid (109.98 to 121.87 %) and vitamin C (73.31 to 110.27 %). Whereas lowest adequacy were recorded for β -carotene (20.80 to 72.51%) and calcium (44.80 to 61.66 %) when compared among three groups. However per cent adequacy for energy (66.02-68.88 %), protein (93.88 to 94.81 %), iron (72.47-82.88%), thiamin (50.55to 86.57 %), riboflavin (59.01 to 79.65 %), niacin (89.37 to 95.94 %) and zinc (54.51 to 60.88 %) were also noted. Highest per cent adequacy for nutrient intake was noted in high income group except for energy, thiamin, folic acid, whereas per cent adequacy was of zinc was more in low income group and intake of folic acid was more in middle income group.

4. Discussion

It is revealed from the table that all subject covered were falling below the NCHS standard in both area and age. Overall when observed the highest and lowest value for height and weight ranging between 92-96 per cent and 80-90 per cent when compared with NCHS standard with respect of all group. Middle income group recorded better value for all anthropometric measurement than low and high income group. Basically out of total selected adolescent girls more than 50 per cent were from low income group (Rs. <10,000/- per month). Almost equal per cent of adolescent girls were from middle income group (Rs.10,001 – 20,000/- per month) and high income (Rs. >20,001/- per month). Though the middle group recorded better height non-significant difference was noted in other group it may be due to variations in consumption pattern, the population selected were from girls residing at home and hostel (50 % each) and food pattern, daily diet was observed same.

It is revealed from the table 2 that majority of selected adolescent girls were normal while remaining were suffering with one or more degree of under nutrition and over nutrition. The studies conducted in Maharashtra state by Mane *etal* (2012), Jawarkar *etal* (2015) and Zanvar and Rohini Devi (2008) also reported that majority of participant were belonging to normal category. The more percentage of girls were normal this may be due to less physical activity. Selected participants were studied in 11th and 12th standard which was crucial period for study. As majority participant spent more time on study and less physical activity and limited outdoor playing and allied activities. Majority were from middle income group and staying in hostel which required less physical stress and consumption pattern was found to almost same. Majority were found to be normal body mass index.

Further as per age it was also observed noticed that intake of green leafy Vegetable, roots & tubers, condiments and

spices, fruits, milk and milk products and fats and oils was found to be high among adolescent girls belonging to 18 years, intake of cereals, pulses, other vegetable, nuts and oilseeds, sugar & jaggery was found to be more among 17 years old, among 16 years adolescent girls food intake was less than higher their counterpart and negligible difference was noted among all age group for intake of pulses, green leafy vegetable, condiments and spices, nuts and oilseeds, fats and oils, sugar & jaggery. Further it was also reported that except fats and oils remaining foods were below than Recommended Dietary Allowances. Twara *et al* (2015) conducted study on 13-15 and 16-18 years adolescent girls from Motihari town, Bihar reported that the average daily consumption of food groups by the adolescent girls of 13 to 15 years and 16 to 18 years was showed that consumption of all the food groups in adolescent girls was very low than the suggested amount.

When seen critically it was crystal clear from the result that the per cent adequacy of cereal, pulses, sugar and jaggery found to be maximum followed by fats and oil seeds. As the daily diet in Maharashtra state included Jowar, Wheat, Rice, Poha or Rawa common ingredients to prepare Bhakri, Chapati, Rice, Khichadi, Poha and Upma. Consumption of these products was found to be frequent and almost daily in one or other meal. Along with this pulses were used in the form of varan, amati, kadhi and different leafy vegetable curry. Oil was used very common for seasoning of vegetables, Dals and applying on chapaties. However adequacy of sugar was found to be high as tea, milk and coffee intake was very frequent and twice a day.

Further as per age it was observed that intake of minerals, vitamins and fat was found to be high among adolescent girls belonging to 18 years, intake of thiamin was found to be more among 17 years old, zinc was found to be higher among 16 years adolescent girls and negligible difference was noted among all age group for intake of energy and protein. The similar trend was noted about mean food intake as per different criterion. Further it was also reported that except fat and vitamin C remaining nutrient was low than Recommended Dietary Allowances. Twara *et al* (2015) conducted study on 13-15 and 16-18 years adolescent girls from Motihari town, Bihar reported dietary inadequacy in respects of energy, protein and micronutrients. Nisha and Varsha (2016) carried out study on adolescent girls 13-15 years and 16-17 years at Fatehabad, Hariyana state noted that except fat remaining nutrients were lower than Recommended Dietary Allowances which was in line with present study.

As the studied girls were from Marathwada zone and the impact of socio economic factor may not influenced on intake of nutrient, because selected girls were from either hostel or residing at home and girls from both group were from urban and rural area, the age group also doesn't matter as they were from post-adolescent group the growth spurt having the same pattern. Food habits and income may influence somehow. In nutshell it is concluded that the nutrient intake was below the Recommended Dietary

Allowances irrespective of all socio economic factors except for fat and folic acid.

When consider age wise percent adequacy was found to be highest for fat, folic acid and vitamin C and lowest adequacy was noted for β - carotene and calcium. Hanagi *et al* (2006) conducted study at Dharwad taluka, Karnataka state reported that the adequacy of protein intake was 46 and 44 per cent and that of vitamin B12 was 54 and 49 per cent respectively. The intake of vitamin A, vitamin B6 and Zinc was less than 20 per cent adequate. However this study goes in hand in hand with present study.

As the present study was conducted in Marathwada and groundnut powder is the main ingredients in all types of gravies prepared for curries apart from this groundnut, seasamum, niger seed coconut and linseed chutney and pickle are commonly prefer either any meal along with curries. Almost important thing use of oil at the time of roasting chapatti and use of extra oil for spicy curries and dal. These many reasons might be raised for highest percent adequacy of fat. Also the percent adequacy was noted maximum for folic acid and vitamin C this may be due to regular consumption of green leafy vegetables like palak, methi, red gram dal. The habit of consume lime on poha, dal, curries are common among studied area. Apart from this lemon juice with sugar and lime in black tea is also very common pattern of lime consumption which forms very good percent adequacy for vitamin C. Consumption of leafy vegetable also enhances the vitamin C intake.

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Table 1: Anthropometric measurements of selected urban and rural adolescent girls in different family income (n=600)

Income Group (Rs. Per month)	Urban							Rural						
	Height (cm)	Weight (Kg)	BMI (Kg/m ²)	MUAC (cm)	Hip circumference (cm)	Waist Circumference (cm)	Hip /waist ratio	Height (cm)	Weight (Kg)	BMI (Kg/m ²)	MUAC (cm)	Hip circumference (cm)	Waist circumference (cm)	Hip /waist ratio
<10000	154.87	44.67	18.75	23.04	76.11	68.38	0.90	152.86	45.531	20.10	22.54	81.12	65.31	0.80
10001-20000	154.69	45.76	19.16	23.02	77.52	69.85	0.94	152.18	45.395	18.86	22.46	80.34	63.94	0.80
>20001	155.12	45.87	18.71	23.05	75.40	74.47	0.88	151.55	45.899	19.50	22.93	81.84	66.38	0.81
't' value	0.14 ^{NS}	1.30 ^{NS}	1.05 ^{NS}	0.002 ^{NS}	1.20 ^{NS}	6.45 ^{**}	1.53 ^{NS}	1.19 ^{NS}	0.09 ^{NS}	7.39 ^{**}	0.75 ^{NS}	0.62 ^{NS}	1.02 ^{NS}	0.06 ^{NS}
CD	----	----	----	----	----	4.841	----	----	----	1.158	----	----	----	----

** - Significant at 1% level, NS- Non Significant

Table 2: Prevalence of under nutrition among selected adolescent girls per area and family income group (n=600)

Different grades of under nutrition	Urban			Rural		
	Income (Rs. Per month)			Income (Rs. Per month)		
	Rs.<10000	Rs. 10001-20000	Rs. >20001	Rs.<10000	Rs.10001-20000	Rs. >20001
Sever	11 (10.00)	10 (8.84)	10 (12.98)	6 (3.68)	2 (2.5)	2 (3.50)
Moderate	18 (16.36)	15 (13.27)	9 (11.68)	12 (7.36)	11 (13.75)	4 (7.00)
Mild	31(28.18)	23 (20.35)	12 (15.58)	37 (22.69)	16 (20.00)	10 (17.54)
Normal	49(44.54)	59 (52.21)	43 (55.84)	105 (64.41)	50 (62.50)	40 (70.15)
Obese	1 (0.90)	6 (5.30)	3 (3.89)	3 (1.84)	1 (1.25)	1 (1.75)
Total	110	113	77	163	80	57

Figures in parenthesis indicate percentage.

Table 3: Mean food intake of selected adolescent girls as per age (n=600)

Age	Cereals (g)	Pulses (g)	Green leafy Vegetable (g)	Roots & Tubers (g)	Other vegetable (g)	Condiments and spices (g)	Nuts and oilseeds (g)	Fruits (g)	Milk and milk products (g)	Fats and Oils (g)	Sugar & jaggery (g)
16 years	238.94 ±38.32	43.44 ±25.65	30.45 ±14.72	35.87 ±22.62	42.57 ±50.13	20.28 ±6.32	17.00 ±6.68	27.12 ± 12.29	84.48 ±23.25	22.92 ±7.08	22.31 ±6.52
17 years	260.37 ±43.99	48.67 ±30.44	32.25 ±17.71	32.26 ±21.96	57.99 ±32.85	21.49 ±8.28	19.52 ±7.10	36.30 ±24.23	96.14 ±26.37	27.60 ±4.83	24.82 ±7.43
18 years	259.57 ±34.91	43.91 ±23.33	33.53 ±19.53	40.01 ±17.95	54.78 ±30.61	25.23 ±11.20	18.68 ±5.68	33.04 ±19.47	117.23 ±49.27	28.04 ±6.75	23.10 ±6.87
RDA	330	75	100	200	200	---	----	100	500	35	25
't' value											
16 Vs 17	5.71 ^{**}	2.33 [*]	1.22 ^{NS}	1.76 ^{NS}	5.79 ^{**}	1.82 ^{NS}	4.00 ^{**}	5.40 ^{**}	5.15 ^{**}	8.23 ^{**}	3.93 ^{**}
16 Vs 18	4.59 ^{**}	0.17 ^{NS}	1.36 ^{NS}	1.70 ^{NS}	3.35 ^{**}	3.97 ^{**}	2.26 ^{**}	2.69 ^{**}	6.09 ^{**}	5.98 ^{**}	0.93 ^{NS}
17 Vs 18	0.18 ^{NS}	1.56 ^{NS}	0.55 ^{NS}	3.37 ^{**}	0.85 ^{NS}	2.94 ^{**}	1.14 ^{NS}	1.30 ^{NS}	3.92 ^{**}	0.58 ^{NS}	2.03 ^{**}

NS-non significant, *- significant at 5 per cent, ** - significant at 1 per cent

Table 4: Percent adequacy of food intake among adolescent girls as per age (n=600)

Particular	16 years	17 years	18 years
Cereals (g)	72.41	78.90	78.66
Pulses (g)	57.92	64.90	58.55
Green leafy Vegetable (g)	30.45	32.25	33.53
Roots & Tubers (g)	17.94	16.13	20.01
Other veg. (gm)	21.29	28.99	27.39
Fruits (g)	27.12	36.30	33.04
Milk and milk products (ml)	16.90	19.23	23.45
Fats & oil (g)	65.50	78.86	80.12
Sugar & jaggery (g)	89.25	99.26	92.39

Table 5: Nutrient intake of college going adolescent girls as per age (n=600)

Particular	16 years	17 years	18 years	RDA	't' value		
					16 vs17years	16vs 18 years	17 vs18 years
Energy (Kcal)	1642.54±269.45	1695.45±287.57	1590.13±274.27	2440	2.12 [*]	1.54 ^{NS}	3.18 ^{**}
Protein (g)	49.05±10.33	49.35±8.24	48.54±6.70	52.1	0.36 ^{NS}	0.56 ^{NS}	0.97 ^{NS}
Fat (g)	45.11±39.91	41.75±13.17	46.47±16.14	35	1.18 ^{NS}	0.42 ^{NS}	2.55 [*]
Iron (mg)	19.56±4.82	19.08± 5.54	23.19±3.96	26	1.03 ^{NS}	6.87 ^{**}	7.85 ^{**}
Calcium (mg)	374.36±235.59	373.61±120.66	502.18±134.78	800	0.04 ^{NS}	5.96 ^{**}	8.19 ^{**}
β-carotene (µg)	879.61±1539.50	1480.91±1874.67	4725.54±4854.57	4800	3.96 ^{**}	7.44 ^{**}	6.27 ^{**}
Thiamine(mg)	0.79±0.39	0.83±0.60	0.51±0.24	1.0	0.87 ^{NS}	7.71 ^{**}	7.48 ^{**}
Riboflavin(mg)	0.68±0.15	0.77±0.26	1.14±1.61	1.2	4.95 ^{**}	2.73 ^{**}	2.18 ^{NS}
Folic acid (mg)	154.33±44.04	181.73±68.26	184.27±102.40	150	5.49 ^{**}	2.70 ^{**}	0.22 ^{NS}
Niacin (mg)	13.35±4.88	12.30±3.55	14.21±18.51	14	2.65 ^{**}	0.44 ^{NS}	0.98 ^{NS}
Vitamin C (mg)	43.69±23.28	30.57±11.75	47.62±16.05	40	7.55 ^{**}	1.70 ^{NS}	9.43 ^{**}
Zinc (mg)	7.38±1.59	6.63±1.39	6.66±9.56	12	5.50 ^{**}	0.71 ^{NS}	0.04 ^{NS}

NS-non significant, ** - significant at 5 per cent, *- significant at 1 per cent

Table 6: Percent adequacy of nutrient intake among selected adolescent girls as per income group (n=600)

Particular	Rs. >10,000	Rs. 10001-20000	Rs. <20001
Energy (Kcal)	68.88	68.31	66.02
Protein (g)	94.30	93.88	94.81
Fat (g)	128.38	120.56	123.34
Iron (mg)	76.14	72.47	82.88
Calcium (mg)	44.80	46.77	61.66
β -carotene (μ g)	20.80	34.60	72.51
Thiamine(mg)	86.57	81.78	50.55
Riboflavin(mg)	59.01	66.64	79.65
Folic acid (mg)	112.52	121.87	109.98
Niacin (mg)	93.27	89.37	95.94
Vitamin C (mg)	101.83	73.31	110.27
Zinc (mg)	60.88	54.76	54.51