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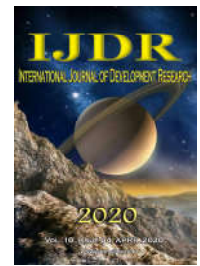
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ANTHROPOMETRICALLY DETERMINANT OF UNDERNUTRITION AMONG SELECTED ADOLESCENT GIRLS

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ABSTRACT

Present investigation was carried out on correlation between dietary habit and anaemia among 600 adolescent girls of 16-18years from Parbhani district, Maharashtra. 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 BMI was calculated using value of height and weight. On the basis of BMI, adolescent girls were categorized into different grades of under nutrition. 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. The finding of study showed that Almost 40 percent of each adolescent girls from 16 and 17 years were residing at hostel and 54.00 percent and 40.67 percent of 16 and 17 years were residing in home whereas around 20 percent and 5.3 percent girls of 18 years were residing at hostel and home. Urban girls were better in their anthropometric measurements than rural adolescent girls. Height of urban and rural area irrespective of age in comparison of NCHS standard revealed a deficit of 4.73 to 6.94 per cent. The deficit in weight recorded by urban girls was 18 per cent whereas rural girls recorded 20 per cent. When observed age wise high percent of normal girls from 16 years on the contrary majority of 18 years adolescent girls categorized under the grade of mild, moderate and overweight, while 17 years girls were suffering with severe under nutrition. The food intake among urban girls recorded more consumption for cereals, roots and tubers, other vegetables. Whereas among rural girls consumption of nuts and oilseeds, milk and milk products was found to be more. However consumption of pulses, green leafy vegetable, sugar and jaggery was found to almost same in both groups of girls. In case of nutrient intake among urban and rural adolescent girls it was noted that the urban girls recorded more intake for energy, protein, iron, thiamin, folic acid, vitamin C, zinc. However consumption of fat, calcium, β - carotene, riboflavin and niacin was found to be more among rural adolescent.

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INTRODUCTION

Adolescence a period of transition between childhood and adulthood, occupies a crucial position in the life of human beings. This period is an important physiological phase of life characterized by an exceptionally rapid rate of growth and development both physical and psychological. Growth of adolescent can be assessed by anthropometric measurements ie.by height, weight, Mid upper arm circumference, hip: waist ratio and BMI.

BMI (Body Mass Index) is a widely used parameter and it is moderately associated with height among adolescents. BMI reflects the positive association between height and weight. Anthropometry can be used for various purposes, depending on the anthropometric indicators selected. The nutritional status of adolescent age group is difficult to assess because there is not reference standard for adolescents and there is a growth spurt which occurs with puberty which occurs at different ages. As with children, adolescent anthropometric assessment is used to reflect under nutrition.

Anthropometry is also used to reflect over nutrition but this is not the focus of this guide. Under nutrition in adolescents is characterized by patterns of acute and chronic deficiency of energy, protein and micronutrients including vitamins and minerals. Often a person is affected by both acute and chronic deficiency in all or some of the key nutrients. Anthropometry is influenced by nutrition particularly in the rapidly growing period of adolescence. Selected body measurement can therefore give valuable information concerning certain types of Malnutrition (Jelliffe 1966). Malnutrition (under nutrition or over nutrition) which refer to an impairment of health either from a deficiency or excess imbalance of nutrient is of public health significance among adolescent all over the world (Azam *et al.*, 2014). 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. Diet and health are synonymous with the well-being of an individual. In absence of proper and adequate nutrition, a person can develop several developmental malformations. The manifestation of the deficiency and the measurement is, complicated to determine and the functional significance unclear. Under nutrition is characterized by a lack of food and while specific nutrient deficiencies occur, such as pellagra due to a lack of niacin, the primary cause is more general. In view of this present study was carried out to find out anthropometric determinant of under nutrition among selected urban & rural adolescent girls.

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 of Parbhani. 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 (BMI) was calculated using value of height and weight. On the basis of BMI, adolescent girls were categorized into different grades of under nutrition. 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.

RESULTS

Socio-economic background of selected adolescent girls: Socio-economic background of selected adolescent girls distributed into different socio-economic categories is explained in Table 1. The distribution of adolescent girls in urban and rural area was same. Adolescent girls as per age residing at home were 54 per cent, 40.67 per cent and 5.3 per cent belonged to 16 years, 17 years and 18 years respectively. Whereas girls residing at hostel were 40.33 per cent belong to 16 years and 17 years and 19.33 per cent belonged to 18 years.

Major per cent of girls were from nuclear families residing at home (79.33 %) and residing at hostel (80 %). Whereas 19.67 per cent and 0.67 per cent were from joint and extended families. More number of families was having 4-6 members and vegetarian were (93.67 %). The girls were also distributed into different categories of income level based upon the family income per month. Accordingly majority of girls residing at home (54.33%) and residing at hostel (40.67 %) were belonging to the income group Rs. <10,000 per month. However girls residing at home 27 per cent and 26 per cent hostel were belonging to income group Rs. 10,001 to 20,000 per month whereas girls residing at home (18.67%) and residing at hostel (24.33 %) were belonging to income group Rs. >20,001 per month respectively.

Anthropometric measurements of adolescent girls as per age and area: Anthropometric measurements of adolescent girls compared with NCHS standard is presented in Table 2. The height of urban and rural adolescent girls in all age groups was significantly lower than NCHC standard. The height of urban and rural girls aged 16 years were 154.44 ± 5.44 and 150.83 ± 5.39 cm respectively. The weight of adolescent's girls from urban and rural area was 45.40 ± 7.02 and 44.72 ± 5.37 kg. Body mass index ranged from 20.13 ± 2.5 and 18.88 ± 1.68 kg/m² for urban and rural area. It was observed that urban adolescent's girls aged 16 years showed better values for weight, height and BMI than rural adolescent's girls. Whereas the height of urban and rural adolescent's girls aged 17 years ranged from 154.81 ± 5.94 and 153.72 ± 4.35 cm, weight ranged from 46.23 ± 7.34 and 45.21 ± 4.47 kg and body mass index was noted 19.15 ± 3.09 and 19.73 ± 2.16 kg/m² respectively. It was noted that urban girl's exhibits better values for height and weight while rural girls noted highest value for body mass index. Similar trend was noted for adolescent's girls aged 18 years from urban and rural areas for height, weight and body mass index which was ranged from 156 ± 6.30 to 153.23 ± 4.11 cm, 46.01 ± 7.26 and 45.07 ± 4.88 kg, 17.96 ± 1.86 and 20.26 ± 2.61 kg/m² respectively. However the statistical analysis and the 't' values revealed that the 16 years old adolescents girls from both the area falling below standard for height, weight and body mass index. The urban adolescent's girls of 17 years old exhibits more values for height, weight and except for body mass index rural adolescents exhibits more values. Similar trend was observed for 18 years old adolescent girls. However as per 't' values adolescents girls from both area and three age groups were exhibiting low height, weight and body mass index as compared to NCHS standard.

Prevalence of under nutrition among selected urban and rural adolescent girls as per age and area: Prevalence of under nutrition in the selected adolescent girls per age and area is presented in Table 3. It was revealed from the table that irrespective of area and age maximum percentage of girls were normal (40.35 - 69.67%) and minimum percentage was noted as obese (1.35 - 7.02 %) whereas percentage of mild grade of under nourished girls (15.29- 26.72 %) were more than moderate (7.91-14.12 %) and severe grade of under nutrition (3.05-15.79 %) respectively. Overall when seen more number of girls from rural area of different age group were found to be normal as compared to urban adolescent girls.

Mean food intake of selected adolescent girls as per area: Table 4 revealed the information on mean food intake of selected adolescent girls as per area.

Table 1 Socio-economic background of selected adolescent girls (n=600)

Sr.No.	Particular	Residing at home	Residing at hostel	Total
1	Area			
	Urban	150 (50)	150 (50)	300 (50)
	Rural	150 (50)	150 (50)	300 (50)
2	Age			
	16 yrs	162 (54)	121 (40.33)	283 (47.17)
	17 yrs	122 (40.67)	121 (40.33)	243 (40.5)
	18 yrs	16 (5.3)	58 (19.33)	74 (12.33)
3	Type of family			
	Joint	60 (20)	58 (19.33)	118 (19.67)
	Nuclear	238 (79.33)	240 (80)	478 (79.67)
	Extanded	2 (0.67)	2 (0.67)	4 (0.67)
4	No. of family member			
	4-6 members	187 (62.33)	163 (54.33)	350 (58.33)
	>6 members	113 (37.33)	137 (45.67)	250 (41.67)
5	Food habits			
	Vegetarian	276 (92)	286 (95.30)	562 (93.67)
	Non- vegetarian	24 (8)	14 (4.67)	38 (6.33)
6	Family income			
	Rs.<10000	163 (54.33)	149 (40.67)	312 (52)
	Rs.10001- 20000	81 (27)	78 (26)	159 (26.5)
	Rs.>20001	56 (18.67)	73 (24.33)	129 (21.5)

Figure in parenthesis indicate percentage

Table 2. Anthropometric measurements of selected adolescent girls as per age and area (n=600)

Particular	16 years			17 years			18 years		
	Height (cm)	Weight (kg)	BMI (kg/m ²)	Height (cm)	Weight (kg)	BMI (kg/m ²)	Height (cm)	Weight (kg)	BMI (kg/m ²)
Urban	154.44± 5.44	45.40± 7.02	20.13± 2.5	154.81±5.94	46.23± 7.34	19.15±3.09	156.07± 6.30	46.01±7.26	17.96±1.86
Rural	150.83± 5.39	44.72 ±5.37	18.88± 1.68	153.72± 4.35	45.21 ±4.77	19.73±2.16	153.23± 4.11	45.07± .88	20.25±2.61
NCHC Standard	162.1	55.9	21.3	163.1	56.7	21.34	163.70	56.6	21.3
t value									
Urban	12.03**	12.76**	3.98**	18.16**	18.59**	9.25**	0.17 ^{NS}	12.67**	0.38 ^{NS}
Rural	24.66**	11.21**	7.70**	24.65**	10.49**	3.55**	13.96**	9.70**	1.98 ^{NS}

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

Table 3. Prevalence of under nutrition among selected adolescent girls as per age and area (n=600)

Different grades of under Nutrition	Urban			Rural		
	16 years	17 years	18 years	16 years	17 years	18 years
Sever	8 (11.11)	14 (8.24)	9 (15.79)	5 (3.60)	4 (3.05)	1 (3.33)
Moderate	9 (12.50)	24 (14.12)	8 (14.04)	11 (7.91)	12 (9.16)	4 (13.33)
Mild	17 (23.61)	26 (15.29)	13 (22.81)	23 (16.55)	35 (26.72)	5 (16.67)
Normal	36 (50.00)	101 (59.41)	23 (40.35)	97 (69.78)	78 (59.34)	20 (66.67)
Obese	2 (2.78)	4 (2.35)	4 (7.02)	3 (2.16)	2 (1.35)	----
Total	73	170	57	139	131	30

Figures in parenthesis indicate percentage.

Table 4. Mean food intake of selected adolescent girls as per area (n=600)

Particular	Urban	Rural	Balance diet	't' value
Cereals (g)	277.90 ± 30.42	223 ± 35.18	330	20.37**
Pulses (g)	37.25 ± 13.40	37.25 ± 13.40	75	8.71**
Green leafy Vegetable(g)	32.70±18.55	31.87±18.47	100	0.55 ^{NS}
Roots & Tubers (g)	37.10±23.94	32.70±19.51	200	2.47 [†]
Other veg. (g)	66.12±30.98	36.28±21.33	200	13.48**
Condiments and spices (g)	22.03 ± 9.21	21.31 ± 7.16	---	1.06 ^{NS}
Nuts and oilseeds (g)	16.18±6.28	21.16± 7.09	---	9.25**
Fruits (g)	32.5±20.74	31.44±19.27	100	0.65 ^{NS}
Milk and milk products (ml)	83.53 ± 23.58	106.57±34.73	500	9.50**
Fats & oil (g)	24.5±7.07	27.45±5.24	35	5.81**
Sugar & jaggery (g)	23.37±7.34	23.87±6.70	25	0.87 ^{NS}

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

The cereal consumption of urban and rural respondent was 277.90 g and 223 g respectively, which was below the ICMR recommendation level. Consumption of pulses (37.25 ± 30.82g), green leafy vegetable (32.70 ± 18.55g), roots and tubers (37.10 ± 23.94g), other vegetable (66.12 ± 30.98g) fruits (32.5 ± 20.74g) and Condiments and spices

(22.03 ± 9.21g) was more in urban areas on the other hand rural adolescent girls consumed more milk and milk products (106.57 ± 34.73g), nuts & oil seeds and fats & oils (21.16 ± 7.09g and 7.45 ± 5.24g). Whereas the consumption of sugar and jaggery was found almost equal in both group with statistically non-significant difference.

Table 5 Mean Nutrient intake of adolescent girls as per area (n=600)

Particular	Urban	Rural	RDA	't' value
Energy (Kcal)	1701.04±294.68	1620.18±261.85	2440	3.44**
Protein (g)	51.23±10.20	47.02±6.58	52.1	6.01**
Fat (g)	39.27±15.10	48.05±33.39	35	4.16**
Iron (mg)	20.19±5.37	19.58±5.16	26	1.47 ^{NS}
Calcium (mg)	352.30±203.65	434.88±135.84	800	5.09**
β-carotene (μg)	1024.57±1319.17	2507.35±3577.95	4800	6.86**
Thiamine(mg)	0.80 ± 0.42	0.64±0.52	1.0	6.27**
Riboflavin(mg)	0.72 ± 0.17	0.87±0.94	1.2	2.7**
Folic acid (mg)	175.20±58.79	169.68±77.76	150	0.96 ^{NS}
Niacin (mg)	12.93±4.32	13.00±10.77	14	0.12 ^{NS}
Vitamin C (mg)	39.11±22.14	36.52±14.47	40	1.62 ^{NS}
Zinc (mg)	7.35±1.62	6.45±5.36	12	2.74*

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

On the whole when observed per cent significant difference was noted in consumption of cereals, pulses, roots and tubers, nuts and oil seeds, milk and milk products and fats and oils. Recorded values for all the food groups from both the areas were below than ICMR recommended values.

Nutrient intake of adolescent girls as per area: Mean nutrient intake of adolescent girls from urban and rural area is present in Table 5. Data revealed that the nutrient intake of urban adolescent girls were energy (1701.04 Kcal), protein (51.23 g), fat (39.27g), iron (20.19 mg), calcium (352.30 mg), β-carotene (1024.57μg), thiamine (0.80mg), riboflavin (0.72 mg), folic acid (175.20 mg), niacin (12.93 mg), vitamin C (39.11mg) and zinc (7.35mg) whereas nutrient intake of rural adolescent girls were energy (1620.18 Kcal), protein (47.02 g), fat (48.05 g), iron (19.58 mg), calcium (434.88 mg), β-carotene (2507.35 μg), thiamine (0.64 mg), riboflavin (0.87 mg), folic acid (169.68 mg), niacin (12.93 mg), vitamin C (36.52 mg) and zinc (6.45 mg) respectively. It was also noticed that the intake for various nutrient was more in urban adolescent girls except for calcium, β-carotene, riboflavin and niacin which was found to be consumed more in rural adolescent girls. The intake of fat and folic acid was found to be more than RDA. Except for iron, folic acid, niacin and vitamin C significant difference was seen for other nutrients.

DISCUSSION

It is evident from table the table 1 regarding factors influencing on socio economic background of selected adolescent girls that majority of girls residing at home hostel were 16 years old (54 and 40.67 %) followed by 17 years old (5.3 and 40.67 %) and 18 years old (5.3 and 19.33 %) respectively. Gaiki and Wagh (2014) conducted study at Wardha, Maharashtra on 15-18 years old adolescent. It is revealed from their study that distribution of sample as per age as was 16 years (32.00 %) followed by 15 years (24.94 %) and almost equal girls were from 18 year to 19 years of age. Irrespective of area majority families were nuclear. However in the present study more per cent (79.67 %) of nuclear families were existing and families consisted of 4-6 members (58.33%).

The present result was in hand in hand with the observations made by Zanvar *et al* (2007). The present studies also revealed that more percentage of girls were vegetarian (93.67 %) than non vegetarian (6.33 %). This is in accordance with the existing fact that majority were vegetarian. Tak and Wadhwan (2016) reported that 62.5 per cent girls were vegetarian. These finding go in hand in hand existing study on adolescent girls.

The influence of area combined with age on growth and development of adolescent girls (Table.2) revealed that urban girls were better in their anthropometric measurements than rural adolescent girls. Height of urban and rural area irrespective of age in comparison of NCHS standard revealed a deficit of 4.73 to 6.94 per cent. The deficit in weight recorded by urban girls was 18 per cent whereas rural girls recorded 20 per cent. These finding clearly indicated that the urban girls were comparatively better in their anthropometric measurement over rural adolescent girls. However these finding is in line with a study conducted by Hengi *et al* (2000) Zanver *et al* (2007) and Kowsalya *et al* (2008) also found that the mean height and weight of the selected adolescent girls were below NCHS standard. Persual of tables 3 revealed that maximum percent of normal girls were present in rural area while high percent of urban girls were suffered with one or more grade of under nutrition and over nutrition. The urban girls recorded more consumption for cereals, roots and tubers, other vegetables. However consumption of pulses, green leafy vegetable, sugar and jaggery was found to almost same in both group of girls. However consumption of nuts and oilseeds, milk and milk products was found to be more among rural girls (Table 4). It can be concluded from the table that the availability of vegetables and fruits throughout the year is more common at urban places however plenty of milk and milk products available at rural household as majority family were raring cattles. The consumption of nuts and oilseed is also found to more in rural areas, as the preparation of curries required more groundnuts. 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 by the adolescent girls of 13 to 15 years and 16 to 18 years was very low than the suggested amount. Table 5. revealed about nutrient intake between urban and rural adolescent girls. it was noted that the urban girls recorded more intake for energy, protein, iron, thiamine, folic acid, vitamin C, zinc. However consumption of fat, calcium, β- carotene, riboflavin and niacin was found to be more among rural adolescent. Zanver *et al* (2007) and Borkar and Khan (2017) conducted study among rural girls from Parbhani, Maharashtra state observed that the intake of all nutrient was less than Recommended Dietary Allowances except for fat, calcium and thiamine. Sachan *et al* (2013) conducted study at Lucknow, Uttar Pradesh on urban and rural adolescent girls reported that nutrient intake was less than Recommended Dietary Allowances. However these studies were in line with the present study.

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