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S.No	Title of paper	Name of journal	Year of publication	ISSN number	Is it listed in UGC Care list/Scopus/Web of Science/other, mention
1	A Study on Nutrient Intake and Prevalence of Anaemia	Kaav International Journal of Arts, Humanities & Social Sciences	2020	2348-4349	Yes
2	Comparison of dietary intake and nutritional status of adolescent girls residing at home and hostel	Shodh Sanchar Bulletin Bi –Lingual Inter National Journal	2020	2229-3620	UGC Care Listed Journals

3	Comparative analysis of health status of selected 16-18 years adolescent girls	International Journal of Home Science	2020	2395-7476	Yes
4	Prevalence of under nutrition associated with socio demographic Characters	International Journal of Recent Scientific Research	2020	0976-3031	Yes
5	Anthropometrically determinant of undernutrition among selected adolescent girls	International Journal of Development Research	2020	2230-9926	Yes
6	Impact of family income on physical status, dietary pattern and nutrient intake among urban and rural adolescent	International Journal of Science and Research (IJSR)	2020	2319-7064	Yes
7	A study on commonly observed deficiency symptoms among adolescent girls	KAAV International Journal of Econimcs,commerce and Bussiness Management	2020	2348-4969	Yes
	Screening of adolescent girls for nutritional status as per food habit	International Journal of Creative Research Thoughts (IJCRT	2020	2320-2882	Yes

9	A cross sectional study on anthropometric variables on growth & nutritional status of adolescent girls	International Journal of Current Research	2020	0975-833X	Yes
10	Impact of climate change on Agriculture : in view of India	Vidyabharati International Interdisciplinary Research Journal	2022	ISSN :2319-4979	Yes
11	Skill Development A need for Career oppourtunity	International Journal of Scientific Research in Social Science and Technology	2023	ISSN: 2395-602 X ISSN:2395-6011	Yes

Book Chapters:3

Sl. No.	Title of the paper	Title of the book/chapters published	Year of publication	ISBN/ISSN number of the proceeding
1	Kartoli (Spine gourd) Amazing Wild vegetable	Wild Vegetables, Kalon Maple Publishing	2022	ISBN: 978-93-91141-18-9
2	Entrepreneurship through Home Science	Home Science skills in Industrial Entrepreneurship For Upliftment Of Life	2022	ISBN-978-1-4357-6491-0
3	A Review on Health Benefits Of Millets	Emerging Trends In Science, Social Science, Engineering And Management - A Multidisciplinary Approach Volume - 1	January, 2023	ISBN:978-1-387-57678-4 ISBN-10:1-387-57678-X

Book-1

Book Title	Publication	ISBN No.	Publication International/ National/ Local
Age of Miracles- Teenagers	KAAV Publication,Delhi	978-81-952435-0 5	National

Kaav International Journal of Arts, Humanities & Social Sciences
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A Study on Nutrient Intake and Prevalence of Anaemia

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Abstract

Present study was carried out to assess nutrient intake and prevalence of anaemia among adolescent girls by following purposive sampling technique. Total 600 adolescent girls i.e.300 each from urban and rural area of Parbhani district of Maharashtra state was covered. Further from both areas 150 each were randomly selected from hostel and residing at home. Information about socio economic background was collected through pre designed questionnaire. 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 (Gopalan etal 2000) nutrient intake was calculated. The haemoglobin content was estimated by Sahli's method. 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. The range food intake was as followed cereal 223.00 ± 35.18 to 277.90 ± 30.42 g, pulses 37.25 ±13.40 to 52.76 ± 40.53 g, green leafy vegetable 28.95± 17.29 to 34.68 ± 21.1 g, roots and tubers 32.26 ± 1.96 to 40.01 ± 7.95 g, other vegetables 36.26 ± 21.33 to 66.12 ± 30.12g, condiments and spices 18.19 ± 11.37 to 25.23 ± 11.20g, nuts and oil seeds 12.00 ± 0.00 to 21.16 ±7.09 g, fruit 23.82 ± 10.36 to 36.3 ± 4.23g, milk and milk products 83.53 ± 23.58 to 117.23 ± 49.27g and sugar & jaggery 23.1 ±6.87 to 25.63 ± 6.48 g respectively. The food intake was below the balance diet. Whereas range of nutrient intake was as followed calorie 1590.13 to 1759.68 Kcal, protein and fat intake ranged from 47.02 to 51.23g and 39.27 to 46.47 , intake of minerals iron, calcium and zinc were ranged from 18.84 to23.19 mg, 323.20 to 502.18 mg and 6.45 to 8.86 mg respectively. β-carotene 96.93 to 4725.54 µg, thiamine, riboflavin and niacin ranged from 0.51 to 0.90 mg, 0.68 to 1.14 mg and 11.68 to14.21mg, folic acid intake ranged from 154.33 to 184.27 mg and vitamin C 29.33 to 61.53 mg respectively. When compared with RDA except for fat remaining nutrients were below the RDA. The haemoglobin values of selected adolescent girls were ranged from 9.37±1.51 to 9.93±1.03 g/dl, nearly (90 percent) of adolescent girls suffering with moderate and mild anaemia.

Introduction:

Adolescence is an intense anabolic period when requirements for all nutrients increase. Good nutrition promotes the production and activities of growth hormones, which influences the metabolism of proteins, carbohydrates, fats, mineral and promotes nitrogen retention. Adequate nutrition and healthy eating and physical exercise habits at this age are foundations for good health in adulthood. If the adolescents are well-nourished, they can make optimal use of their skills, talents and energies and would be healthy and responsible citizens. Adolescence, a second period of rapid growth may serve as an opportunity for compensating early childhood growth though the potential for significant catch-up is limited. Nutritional requirement in relation to body size is more during adolescence. Biologists and nutritionists have charted the effect of nutritional deficiencies on the human growth profile. Nutritional deficiencies have far reaching consequences, especially in adolescent girls.

Due to insufficient nutrient intake there is a chance to develop nutritional deficiency problem. Iron deficiency anaemia is one of the major nutritional deficiency problem. Iron is one of the important micronutrient; it is used for formation of haeoglobin, oxygen transportation, brain development, regulation of body temperature and muscle activity. When the iron is decreased in human body, it is called as iron deficiency. Iron deficiency is the most common etiological factors in anemia. The decreased hemoglobin level is called as iron deficiency anaemia. Anaemia is a serious public health problem, which affects the mental and physical development, as well as health maintance and work performance. Anaemia is a common blood disorder associated with abnormal reduction in red blood cell count (RBC), haeoglobin (Hb) and/or hematocrit (Hct) values below the established normal reference values.

Methodology:

Selection of the Sample

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 district. Equal number of adolescent girls i.e. 150 each residing at home and in hostel were covered for the study. Availability of adolescent girls was ascertained through visit to college, hostel and home.

Assessment of food intake

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.

Estimation of Haemoglobin Content:

To judge the extent of prevalence of anaemia all the 600 adolescent girls were examined for haemoglobin content by sahli's method was used to estimate haemoglobin level. Based on the determined value of haemoglobin content in the blood of adolescent girls they were classified into four groups as normal (>12g Hb/dl of blood), mild (>10-12 g Hb/dl of blood), moderate (7-10 g Hb/dl of blood) and severe (< 7 g Hb/ dl of blood) anemia .

Statistical Analysis:

The collected data was tabulated and analyzed statistically by applying different suitable tests.

Result and discussion:

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. Mean food intake of selected adolescent girls from different socio economic categories Mean food intake of selected adolescent girls from different socio economic categories is presented in Table 2. Mean intake of cereal ranged from 223.00 ± 35.18 to 277.90 ± 30.42 g. however urban adolescent girls recorded highest intake of cereals (277.90 ± 30.42 g) while lowest intake was noted by rural adolescent girls (223.00 ± 35.18 g). Similarly the adolescent girl belonging to 17 yrs of age group, non-vegetarian and middle income group girls recorded highest intake of cereals than their counter parts. The pulses intake ranged from 37.25 ±13.40 to 52.76 ± 40.53 g. However pulses intake was noted highest for non vegetarian girls (52.76 ±

40.53g) and least values was equally contributed by girls belonging to urban and rural area (37.25 ±13.40 g). Similarly 17 years old adolescent girls and high income girls had better intake of pulses than their counter parts. The range of consumption of green leafy vegetable was 28.95± 17.29 to 34.68 ± 21.1 g. Girls belonging to middle income group showed highest value for consumption of green leafy vegetable (34.68 ± 21.1g) whereas non vegetarian girls showed least values (28.95 ± 17.29 g). Roots and tubers intake ranged from 32.26 ± 1.96 to 40.01 ± 7.95 g. Adolescent girls of 18 years noted highest value (40.01 ± 7.95 g) while adolescent girls of 17 years noted least values (32.26±1.96 g) for intake of roots and tubers. Other vegetables consumption ranged from 36.26 ± 21.33 to 66.12 ± 30.12 g. It was noted that urban adolescent girls showed highest value (66.12 ± 30.12 g) whereas rural adolescent girls showed least values (36.26 ± 21.33 g). Condiments and spices intake ranged from 18.19 ± 11.37 to 25.23 ± 11.20 g. Highest value was reported by 18 years adolescent (25.23 ± 11.20 g) and girls from low income group noted least values (18.19 ± 11.37 g). However Nuts and oil seeds intake ranged from 12.00 ± 0.00 to 21.16 ±7.09 g. However rural adolescent girl recorded highest value (21.16 ±7.09 g) and non vegetarian girls recorded lowest value (12.00 ± 00 g). Moreover fruit intake ranged from 23.82 ± 10.36 to 36.3 ± 4.23g. Further 17 years old girls recorded highest value (36.3 ± 4.23g) whereas non vegetarian girls recorded lowest value (23.82 ± 10.36g). Milk and milk products intake was ranged from 83.53 ± 23.58 to 117.23 ± 49.27 g. Highest intake of milk and milk products was noted among adolescent girl of 18 year (117.23± 49.27g) and lowest intake was noted by urban girls (83.53 ± 23.58 g). Intake of fats and oil ranged from 15.00 ± 2.85 to 27.9 ± 4.44g. However girls from middle income group recorded highest value (27.9± 4.44 g) and 16 years adolescent recorded lowest value (15.00 ± 2.85 g). In case of intake of sugar & jaggery values ranged from 23.1 ±6.87 to 25.63 ± 6.48 g and girls belonging middle income group noted highest value (25.63 ± 6.48 g) whereas adolescent of 18 years noted least values (23.1 ±6.87 g).

Mean Nutrient Intake of selected Adolescent Girls from Different Socio Economic Categories

Mean nutrient intake of selected adolescent girls from different socio economic categories is presented in Table 3. Mean intake of calorie ranged from 1590.13 ± 274.27 to 1759.68 ± 195.63 Kcal. Non vegetarian girls recorded highest intake of calorie (1759.68 ±195.63 Kcal) while lowest intake was noted by adolescent girls of 18 years (1590.13 ± 274.27 Kcal). The protein intake ranged from 47.02 ± 6.58 to 51.23 ± 10.20g. Highest intake was noted for girls belonging to urban (51.23 ± 10.20 g) and least values were noted by rural girls (37.25 ± 13.40 g). Similarly 17 years old adolescent girls and high income girls had better intake of protein than their counter parts. The range of consumption of fat was 39.27± 15.10to 46.47±

16.14g.The highest value was recorded by adolescent girls of 18 year (46.47± 16.14g) whereas urban girls showed least values (39.27±15.10g) for fat. Iron intake ranged from 18.84 ±5.17 to 23.19 ± 3.96 mg. Adolescent girls of 18 years noted highest value (23.19 ± 3.96 mg) while middle income group noted least values (18.84 ± 5.17 mg) for intake of iron. Calcium consumption ranged from 323.20 ± 48.08 to 502.18±134.78 mg. It was noted that adolescent girls belonging to 18 years showed highest value (502.18±134.78 mg) whereas non vegetarian showed least values (323.20 ± 48.08 mg) for calcium. Further β-carotene intake ranged from 96.93 ± 218.99 to 4725.54 ± 4854.57µg. Highest value was recorded by 18 yrs of girls (4725.54 ± 4854.57 µg) and low income group noted least values (96.93 ± 218.99 µg).Thiamine intake was ranged from 0.51 ± 0.24 to 0.90 ± 0.49 mg and non vegetarian recorded highest value (0.90 ± 0.49 mg) and adolescent girls of 18 yrs and high income group recorded lowest value (0.51 ± 0.24 mg). Riboflavin intake was ranged from 0.68±0.15to 1.14±1.61 mg. highest value recorded by girls of 18 yrs (1.14±1.61 mg) whereas lowest value was recorded by 16 yrs old girls (0.68 ± 0.15mg). Folic acid intake ranged from 154.33 ± 44.04 to 184.27 ±102.40 mg. Highest intake for folic acid was noted among adolescent girl of 18 year (184.27±102.40 mg) and lowest was noted by adolescent girl of 16 year (154.33 ± 44.04 mg). Intake of Niacin was ranged from 11.68 ± 2.70 to14.21 ± 18.51mg. Adolescent girls of 18 years recorded highest value (14.21 ± 18.51mg) and non vegetarian girls recorded lowest value (14.21 ± 18.51 mg). Consumption of vitamin C ranged from 29.33 ± 10.91 to 61.53 ± 31.99 mg. Non vegetarian girls recorded highest value for vitamin C consumption and least value was recorded by middle income group. In case of intake of zinc it was noted non vegetarian girls noted highest value (8.86 ± 1.22 mg) whereas rural girls noted least values (6.45 ± 5.36 mg) and intake of zinc ranged from 6.45 ± 5.36 to 8.86 ± 1.22 mg respectively.

Haemoglobin Content of Adolescent Girls per Socio Economic Status

The mean value of haemoglobin level of selected adolescent girls is presented in Table4. The haemoglobin values of selected adolescent girls were ranged from 9.37±1.51 to 9.93±1.03 g/dl. Recorded haemoglobin level of selected all adolescent girls were falling below the normal reference value. Recorded maximum haemoglobin content was in adolescent girls of 18 years old (9.93g/dl) followed by urban girls, high income group girls equally contributed same (9.81 g/dl) and minimum haemoglobin content was in belonging to low income group (9.37g/dl) followed by adolescent girls of 16 years old (9.39 g/dl). Area, age and income exhibited significant difference with reference to haemoglobin content in adolescents.

However residing place and food habits exhibited non - significant difference. In different income group, the adjacent income groups showed significant differences.

Prevalence of Anaemia in Selected Adolescent Girls Belonging to different Socio- Economic Groups

Prevalence of anaemia in selected adolescent girls belonging to different socio economic groups is presented in Table 5. It is evident from the data that irrespective of different socio economic background majority of adolescent girls were moderately anemia followed by mild anemia and severe anemia. As per residing place adolescent girls residing at home and hostel suffering from moderate anaemia (66.66 - 63.00 %), mild anaemia (32.66- 31.66 %), severe anaemia were (0.67 – 2.63 %). However 4.33 per cent girls residing at hostel were in normal criteria.. In case of area of living 58.67 per cent adolescent girls from urban area were moderate anemic,36.33 per cent mild anemic, 1 per cent severe anemic and 4.00 per cent were normal whereas among rural adolescent girls 71.00 per cent were moderately anemic, 28.00 per cent were mild anemic, 0.67 per cent were severe anemic and 0.33 per cent were normal respectively. It was observed that majority of rural adolescent suffered from various degree of anaemia.

When consider age wise majority were suffered from moderate anemia ranged from 57.61 per cent (18 years) to 73.58 per cent (16 years). Contrary mild anaemia was found more in 18 years (38.04 %) and less among 16 years (25.00 %). However no one found to be severely anemic except 1.69 per cent in 17 years of girls.

Majority of vegetarian adolescent girls were found to moderate anemic (65.84 %) and 47.37 per cent non vegetarian suffering with mild anemia. However none of non vegetarian found to be normal and 2.63 per cent was severely anemic. Contrary 2.31 per cent vegetarian girls exhibited as normal and less than 1 per cent was sever anemic. When consider influence an income on degree of anemia it was found that as income increases per cent of moderate anemic (70.33 to 56.72 %) girls decreased and per cent of mild anemic girls increased from (26.74- 39.55 %). Such trend was not observed in case of severe degree of anemia whereas with negligible difference girls were found to be normal.

Discussion:

It can be concluded from the study that highest intake value for roots & tubers, condiments & spices, milk & milk products and fats & oil were recorded by 18 years adolescent girls, intake of pulses and fruits was recorded by 17 years adolescent girl, whereas intake of cereals and other vegetables was mentioned by urban girls. Nuts and oil seeds by rural girl, sugar & jaggery and green leafy vegetable by girl belonging to middle income group. Similar observation was noted by Parimalavalli and Sangeetha (2015) carried out study on adolescent girls residing at home Tamilnadu. Studies conducted in Maharashtra state by Maliye *etal* (2010), Tupe and Chincholikar (2010) Sharma (2012) and Mitra *etal* (2019) observed that nutrient intake among adolescent girls were less than Recommended Dietary Allowances.

Whereas intake of nutrient it was found that 18 yrs girls recorded highest value for intake of fat, iron, calcium, β-carotene, riboflavin, folic acid, niacin and non vegetarian girls also recorded highest value for thiamine, vitamin C and zinc contrary lowest intake energy by 18 yrs, protein and zinc by rural girls, riboflavin and folic acid by 16 yrs, calcium, β-carotene and niacin by non vegetarian girls and iron by middle income group. Twara *etal* (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 that Recommended Dietary Allowances which was in line with present study.

However hemoglobin values were ranged between 9.37 to 9.93 g/dl and it was far below with the standard values of hemoglobin. In the present study nearly (90 percent) of adolescent girls suffering with moderate and mild anaemia. Studies carried out at Marathwada region on adolescent girls by Zanvar etal (2007), Borkar and Khan (2018) reported the prevalence of anaemia among adolescent girls whereas studies on Kharwade and Bhoyar (2014), Zanvar and Kharwadwe (2017), Zanvar and Dhutmal (2019) also reported that majority of selected subject were anemic.

Conclusion:

The finding of present study suggested that for the betterment of upcoming generation there is a need of planning programme for nutrition education and creating awareness of anaemia among adolescent girls.

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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 : Mean food intake of selected adolescent girls (n=600)

Particular	Cereals (g)	Pulses (g)	Green leafy Veg. (gm)	Roots & Tubers (g)	Other veg. (g)	Condiments and spices (g)	Nuts and oilseeds (g)	Fruits (g)	Milk and milk products (ml)	Fats & oil (g)	Sugar & jaggery (g)
ea											
ban	277.90 ± 30.42	37.25 ±13.40	32.70 ±18.55	37.10 ±23.94	66.12 ±30.98	22.03 ± 9.21	16.18 ± 6.28	32.50 ±20.74	83.53 ± 23.58	24.5 ±7.07	23.37 ±7.34
ral	223 ± 35.18	37.25 ±13.40	31.87 ±18.47	32.70 ±19.51	36.28 ±21.33	21.31 ± 7.16	21.16 ± 7.09	31.44 ±19.27	106.57 ±34.73	27.45 ±5.24	23.87 ±6.70
ge											
6 years	238.94 ± 38.32	43.44 ± 25.65	30.45 ± 4.72	35.87 ±2.62	42.57 ± 0.13	20.28 ± 6.32	17.00 ± 6.68	27.12 ± 2.29	84.48 ± 23.25	22.92 ± 7.08	22.31 ± 6.52
7 years	260.37 ± 43.99	48.67 ± 30.44	32.25 ± 17.71	32.26 ± 1.96	57.99 ± 2.85	21.49 ± 32.85	19.52 ± 7.10	36.3 ± 4.23	96.14 ± 26.37	27.6 ± 4.83	24.82 ± 7.43
8 years	259.57 ± 34.91	43.91 ± 23.33	33.53 ± 19.53	40.01 ±7.95	54.78 ± 0.61	25.23 ± 11.20	18.68 ± 5.68	33.04 ±19.47	117.23 ± 49.27	28.04 ± 6.75	23.1 ± 6.87
ood habits											
egetarian	249.53 ± 42.98	45.21 ± 23.82	32.52 ±18.59	34.71 ±21.71	50.88 ±30.55	21.49 ±7.90	19.16 ±7.16	32.52 ±20.40	96.49 ±31.74	26.71 ±5.86	23.57 ±7.17
lon-egetarian	264.21 ±36.99	52.76 ± 40.53	28.95 ±17.29	37.55 ±25.39	55.26 ±29.66	24.42 ±12.19	12.00 ± 0.00	23.82 ±10.36	73.68 ±25.30	15.00 ±2.85	24.4 ±4.16
Family income											
Rs.<10000	247.25 ± 2.27	44.29 ± 23.91	31.96 ± 16.39	32.59 ± 0.45	46.37 ± 7.55	21.05 ± 7.38	16.29 ± 6.43	31.08 ± 19.75	84.1 ± 23.37	23.96 ± 7.09	22.93 ± 7.43
Rs.1000120000	255.63 ± 48.44	44.72 ± 23.51	34.68 ± 21.1	37.53 ± 3.27	53.81 ± 1.21	21.56 ± 8.82	20.48 ± 6.55	27.9 ± 4.44	98.97 ± 25.73	27.9 ± 4.44	25.63 ± 6.48
Rs.>20001	251.84 ± 39.24	48.23 ± 7.69	31.22 ± 19.37	36.38 ± 2.73	56.12 ± 2.79	18.19 ± 11.37	20.87 ± 7.43	28.33 ± 7.46	107.46 ± 39.24	27.51 ± 5.58	23.28 ± 6.55

Table 3: Mean nutrient intake of selected adolescent girls (n=600)

ticular	Energy (Kcal)	Protein (g)	Fat (g)	Iron (mg)	Calcium (mg)	β-carotene (µg)	Thiamine (mg)	Riboflavin (mg)	Folic acid (mg)	Niacin (mg)	Vitamin C (mg)	Zinc (mg)
a												
an	1701.04 ±294.68	51.23 ±10.20	39.27 ±15.10	20.19 ±5.37	352.30 ±203.65	1024.57 ±1319.17	0.80 ± 0.42	0.72 ± 0.17	175.20 ±58.79	12.93 ±4.32	39.11 ± 22.14	7.35 ±1.62
al	1620.18 ±261.85	47.02 ±6.58	48.05 ±33.39	19.58 ±5.16	434.88 ±135.84	2507.35 ±3577.95	0.64 ±0.52	0.87 ±0.94	169.68 ±77.76	13.00 ±10.77	36.52 ± 14.47	6.45 ±5.36
n												
years	1642.54 ± 269.45	49.05 ± 10.33	45.11 ±39.91	19.56 ± 4.82	374.36 ±235.59	879.61 ± 1539.50	0.79 ± 0.39	0.68 ± 0.15	154.33 ± 44.04	13.35 ±4.88	43.69 ± 23.28	7.38 ±1.59

17 years	1695.45 ± 287.57	49.35 ±8.24	41.75 ±13.17	19.08 ± 5.54	373.61 ±120.66	1480.91 ± 874.67	0.83 ± 0.60	0.77 ± 0.26	181.73 ± 68.26	12.30 ±3.55	30.57 ± 11.75	6.63 ±1.39
18 years	1590.13 ± 274.27	48.54 ± 6.70	46.47 ±16.14	23.19 ± 3.96	502.18 ±134.78	4725.54 ±4854.57	0.51 ±0.24	1.14 ± 1.61	184.27 ±102.40	14.21 ±18.51	47.62 ± 16.05	6.66 ±9.56
Food habits												
Vegetarian	1653.91 ± 285.20	49.26 ±8.94	43.86 ± 27.00	19.91 ± 5.36	398.35 ±171.30	1878.81 ± 851.98	0.76 ± 0.50	0.80 ± 0.70	172.06 ± 70.12	13.05 ± 8.43	36.21 ± 16.33	6.77 ±4.07
Non-vegetarian	1759.68 ± 195.63	47.09 ± 6.79	40.72 ± 10.19	19.38 ± 3.76	323.20 ± 48.08	96.93 ± 218.99	0.90 ± 0.49	0.70 ± 0.14	178.04 ±48.23	11.68 ± 2.70	61.53 ± 31.99	8.86 ±1.22
Family income												
Rs<10000	1680.75 ± 295.19	49.13 ± 8.90	44.93 ± 35.75	19.80 ± 5.35	358.37 ±212.17	998.55 ± 1378.51	0.87 ± 0.43	0.71 ± 0.16	168.77 ± 51.34	13.06 ±4.46	40.73 ±22.35	7.31 ±1.63
Rs.10001-20000	1666.70 ± 281.51	48.91 ± 7.71	42.20 ±15.41	18.84 ±5.17	374.19 ±115.50	1660.99 ± 2260.38	0.82 ± 0.64	0.80 ± 0.29	182.80 ± 71.57	12.51 ±3.94	29.33 ±10.91	6.57 ±1.33
Rs.>20001	1610.81 ± 246.47	49.40 ± 10.15	43.17 ± 11.99	21.55 ± 4.86	493.26 ±134.14	3480.61 ± 4441.02	0.51 ± 0.25	0.96 ±1.36	164.97 ±91.51	13.43 ±15.45	44.11 ±14.99	6.54 ±7.93

Table 4 : Hemoglobin content of adolescent girls per socio economic status (n=600)

Sr. No.	Particular	Hemoglobin content	't' value
1. Residing Place			
	Home	9.72±0.88	1.50NS
	Hostel	9.57±1.48	
2. Area			
	Urban	9.81±1.15	5.08**
	Rural	9.40±1.23	
3. Age			
	16 years	9.39±3.67	1 vs 2 3.10**
	17 years	9.70±1.14	1vs 3 3.69**
	18 years	9.93±1.03	2 vs 3 1.42NS
4. Food habits			
	Vegetarian	9.63±1.21	1.39NS
	Non- vegetarian	9.8±1.26	

5. Family income				
	Rs.<10000	9.37±1.51	1 vs 2	2.51**
	Rs.10001-20000	9.71±1.02	1vs 3	2.72**
	Rs.>20001	9.81±1.22	2 vs 3	0.82^{NS}

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

Table 5 : Prevalence of anaemia in selected adolescent girls belonging to different socio economic groups (n=600)

Particular	Degree of anaemia				
	Normal	Mild	Moderate	Severe	Total
Residing Place					
Home	---	98 (32.66)	200 (66.66)	2 (0.67)	300
Hostel	13 (4.33)	95 (31.66)	189 (63.00)	3 (1.00)	300
Area					
Urban	12 (4.00)	109 (36.33)	176 (58.67)	3 (1.00)	300
Rural	1 (0.33)	84 (28.00)	213 (71.00)	2 (0.67)	300
Age					
16 years	3 (1.42)	53 (25.00)	156 (73.58)	---	212
17 years	6 (2.03)	105 (35.47)	180 (60.81)	5 (1.69)	296
18 years	4 (4.35)	35 (38.04)	53 (57.61)	---	92
Food habits					
Vegetarian	13 (2.31)	175 (31.14)	370 (65.84)	4 (0.71)	562
Non- vegetarian	---	18 (47.37)	19 (50.00)	1 (2.63)	38
Family income					
Rs.<10000	5 (1.83)	73 (26.74)	192 (70.33)	3 (1.10)	273
Rs.10001-20000	4 (2.07)	67 (34.72)	121 (62.69)	1 (0.52)	193
Rs.>20001	4 (2.99)	53 (39.55)	76 (56.72)	1 (0.75)	134

Figures in parenthesis indicate percentage.

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COMPARISON OF DIETARY INTAKE AND NUTRITIONAL STATUS OF ADOLESCENT GIRLS RESIDING AT HOME AND HOSTEL

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ABSTRACT

The present study was undertaken to assess study comparison of dietary intake and nutritional status of adolescent girls residing at home and hostel. Total 600 adolescent girls (16-18 years) i.e.300 each from urban and rural area of Parbhani district of Maharashtra state were selected. Further from both areas 150 each were randomly selected from hostel and residing at home. Information about socio economic background and observed sign and symptoms of anaemia was collected through pre designed questionnaire. 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 (Gopalan etal 2000) nutrient intake was calculated. Percent adequacy of nutrient intake was assess by using RDA given by ICMR, 1999. The finding of investigation revealed 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. Almost 80 percent girls from both residing places were belonging to nuclear family. Around 58.33 percent girls having 4-6 family members and 93.67 per cent adolescent girls were vegetarian. From both residing places majority were belonging to low income group followed by middle income group. Comparison of food intake between girls residing at home and Hostel revealed that significant difference was noted for consumption of cereals, pulses, nuts and oil seeds, fruits and fats and oil. Mean food intake was found to be below the recommendation whem compared with balance diet. Per cent adequacy of cereal, pulses, sugar and jaggery found to be maximum followed by fats and oil seeds. Girls residing at hostel recorded more value for energy, fat, iron, calcium, thiamin contrary protein, β- carotene, riboflavin, niacin, folic acid and zinc intake was found to be more by girls residing at home. When recorded values of nutrient intake was compared with Recommended Dietary Allowances it was noted that except fat and folic acid all values were deficient among both group. Further per cent adequacy as per residing place of adolescent girls was noted that it was found to be highest for fat (122.68-126.80 %) followed by folic acid (117.49-112.43 %) vitamin C (93.51- 95.56 %) however lowest per cent adequacy was noted for β- carotene (46.09-27.49 %) and (21.34 – 52.24 %) and calcium (47.83-50.57 %) respectively. Commonly observed sign and symptoms of anemia among selected adolescent girls residing at home and in hostel were tiredness, lethargic, headache feeling itchy, hair loss, poor concentration, pale complexion respectively.

Keywords: *adolescent girls, home, hostel, comparison, dietary intake, nutritional status,anaemia*

Introduction:

Adolescence is the phase that comes during the second decade of a human being's life and regarded as the period of stress and strain, storm and strike.This is the time when an individual undergoes tremendous changes both physically, emotionally and psychologically. During this period, the growth is accelerated by major physical changes in both boys and girls. During this period, more than twenty per cent of the total growth in the stature and up to fifty per cent of adult bone mass is achieved. Developmentally adolescence is a crucial period, particularly with reference to reproductive health.

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The young girls who are at the threshold 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. The rapid growth occurs during adolescence and demands extra nutritional requirements.

Nutritional needs during this period are increased. 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 behaviors that are common among adolescents. Busy schedules may lead to meal skipping, snacking throughout the day and more eating away from home. Peer pressure is very high during adolescence. The need to be in the step with trends and belong to the peer group leads to adolescent eating non-nutritious foods like pizzas, burgers coffees, soft drinks, chocolates and also other roadside junk foods. Awareness about one's body and its appearance becomes the top priority. Due to insufficient nutrient intake there is a chance to develop nutritional deficiency problem. Iron deficiency anaemia is one of the major nutritional deficiency problem. In the light of this investigator undertaken the study on comparison of dietary intake and nutritional status of adolescent girls residing at home and hostel.

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 district. Equal number of adolescent girls i.e. 150 each residing at home and in hostel were covered for the study. Information about socio economic background and observed sign and symptoms of anaemia was collected through personnel visit to college, hostel and home by personal interview method with a pre-planned questionnaire. Availability of adolescent girls was ascertained through visit to college, hostel and home. 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 and percent adequacy of food intake was compared with balanced diet and nutrient intake was compared with the (RDA) recommended dietary allowances given by ICMR, 1999.

Result and discussion:

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. 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.

Mean food intake of selected adolescent girls as per residing place

Mean food intake of selected adolescent girls as per residing place is depicted in Table 2. The information revealed that the range of consumption of different food stuff were cereals (241.45–259.65g), pulses (37.57-53.83g), green leafy vegetable (31.43-33.13g), roots and tubers (34.63-35.17g), other vegetable (50.30- 52.10g), condiments and pulses (19.80-23.54g), nuts and oilseeds (17.16-20.20g), fruits (28.59-35.35g), milk and milk products (92.80-97.30ml), fats and oil (25.05-26.90 g) and sugar and jaggery (23.45-23.78g) respectively. It was observed that the consumption of cereals, pulses, other vegetable, condiments and spices, nuts and oilseeds was more among the girls residing in hostel whereas the consumption of green leafy vegetable, roots and tubers, fruits and milk and milk products was more among the girls residing at home. When the mean consumption of food intake

was compared with balance diet it was found to be below the recommendation. When observed critically except vegetable, milk and milk products, sugar and jaggery statistically significant difference was noted among adolescent of both group for all other food stuffs.

Mean nutrient intake of adolescent girls as per residing place

Table 3 depicted the nutrient intake of adolescent girls residing at home and in hostel. The data revealed that the mean intake of nutrients residing at home and in hostel i.e., calorie (1649.78 and 1671.43 Kcal), protein (50.33 and 47.92 g), fat (42.92 and 44.98 g), iron (19.05 and 20.51g), calcium (382.64 and 404.54g), β-carotene (2212.43 and 1319.49 µg), thiamine (0.73 and 0.81mg), riboflavin (0.82 and 0.76 mg), folic acid (176.24 and 168.64 mg), niacin (13.12 and 12.82 mg), vitamin C (38.23 and 37.41 mg) and zinc (6.96 and 6.84 mg) respectively. When observed critically it was found that all the recorded values were below the RDA except fat and folic acid. Statistically significant difference was noted for protein, iron and β-carotene and other nutrients exhibited non-significant difference.

Per cent adequacy of nutrient intake of selected adolescent girls as per their residing place

Per cent adequacy of nutrient intake among selected adolescent girls from their residing is depicted in Table 4. Irrespective of their residing place the per cent adequacy of nutrient intake was found to be more in case of fat (122.68-126.80 %), folic acid (112.43-117.49 %) followed protein (91.97-96.60 %) and vitamin C (93.51-95.56 %). However less than 60 per cent adequacy was noted for β- carotene (27.49-46.06 %), calcium (47.83-50.57 %) and zinc (57.02-57.96 %). However per cent adequacy of other nutrients was on between 60 to 90 per cent. When seen critically it was observed that girls who were residing at home recorded comparative more values for folic acid, protein, niacin, iron and β- carotene. However girls residing at hostel recorded comparatively maximum nutrient intake of fat, vitamin C, riboflavin, thiamin, energy and calcium.

Sign and symptom of anaemia observed among selected adolescent girls

Sign and symptoms of anemia were depicted in Table 5. It is revealed from the table that commonly observed sign and symptoms of anemia among both group was as follows. Highest per cent was noted for tiredness (71.67 % and 53.33 %) followed by hair loss (55.00 % and 62.00 %), poor concentration (32.67 % and 51.67 %), lethargy (lack of energy) (46.00 % and 41.00 %), headache (39.33 % and 36.67 %), restless in legs (23 % and 40.33 %), feeling itchy (34.00 % and 28.00 %), an abnormality smooth tongue (13.67 % and 32.00 %), pale complexion (20 % and 30 %), pica (20.67 % and 28.33 %), coldness in the hand and feet (20.67 % and 28.67 %), an altered sense of taste(16.33 % and 28.00 %) and shortness of breath (22.00 and 20.00), whereas least than 10 per cent recorded for difficulty swallowing and painful ulcers (open sores) on the corners of your mouth respectively.

Discussion:

Majority of girls residing at home hostel were16 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. These studies are in line with present study. Irrespective of area majority families were nuclear.. Zanvar etal (2007) conducted study in Marathwada zone of Maharashtra state reported that 80.6 per cent selected adolescent girls were from nuclear family and 68 per cent girls were having 4-6 member in family. However in the present study more per cent (79.67 %) of nuclear families were existing and families consisted of 4-6 members (58.33%).

significant difference was noted for intake of cereals, pulses, nuts and oil seeds, fruits and fats and oil. It was also observed from table that girls residing at hostel recorded more values cereal, pulses, other vegetable and condiment and spices however rest of food stuff intake was found to be more by girls residing at home. This could be because the meal pattern at hostel must be uniform like daily Chapatti, Dal, Rice and Curry twice a day. However it may differ at home. When seen critically it was crystal clear from the result that the per cent adequacy of cereal, pulses, sugar and jaggery was found to be maximum followed by fats and oil seeds. Daily diet in Maharashtra included Jowar, Wheat, Rice, Poha or Rawa. 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 tobe high as tea, milk and coffee intake was very frequent i.e. twice and thrice a day.

Significant difference was noted for protein, iron and β- carotene when compared between girls residing at home and hostel. It was observed from the table that girls residing at hostel recorded more value for energy, fat, iron, calcium, thiamin contrary protein, β- carotene, riboflavin, niacin, folic acid and zinc intake were found to be more by girls residing at home. When recorde values of nutrient intake was compared with Recommended Dietary Allowances it was noted that except fat and folic acid other values were deficient among both group. As majority of adolescent girls are choosy about food and very conscious about their weight. Apart from this the type of food consumed were cereal based, consumption of vegetables fruits was also found to be lower, protein intake was almost 50-60 percent. Further when seen critically as per residing place of adolescent girls it was noted that per cent adequacy was found to be highest for fat (122.68-126.80 %) followed by folic acid (117.49-112.43 %) vitamin C (93.51- 95.56 %) however lowest per cent adequacy was noted for β- carotene (46.09-27.49 %) and (21.34 – 52.24 %) and calcium (47.83-50.57 %) respectively.

Banu and Mageshwari (2015) reported that diet consumed by hostel girls were deficit in all nutrients when conducted study on hostel girls in Tamilnadu state. Similar observation was noted by Parimalavalli and Sangeetha (2015) carried out study on adolescent girls residing at home Tamilnadu. Studies conducted in Maharashtra state by Maliye etal (2010), Tupe and Chincholikar (2010) Sharma (2012) observed that nutrient intake among adolescent girls were less than Recommended Dietary Allowances.

Commonly observed sign and symptoms of anaemia reported by selected adolescent girls were tiredness (53.33 -71.67 %), hairloss (55.00-62.00 %), poor concentration (32.67 – 51.67 %) and restless in legs (23.00-40.33 %). When seen such problem which are correlated with anaemia must be associated with some other factors like poor nutrition, stress, hormonal changes heavy blood flow during menarche ete. For symptoms like hair loss and all the reason may be hard water and bore water and use of different shampoo. Adolescent girls of this age group though residing at home and hostel were not habituated of doing ant physical of exercise. Very few of them were reported that the riding of bicycles regularly. Compare to physical stress, mental stress was found to be more. It may be studies, coaching and sometime household task which was mandatory to them.

Conclusion:

Today's adolescents are tomorrow's parents, role models, and patients. Unhealthy food practices and habits could impose health risks later in life and could be passed on to the next generation. So there is need for nutritional education programme to improve healthy food habit through proper food intake.

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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: Mean food intake of selected adolescent girls as per residing place (n=600)

Particular	Home	Hostel	Balance diet	't' value
Cereals (g)	241.45±34.85	259.65±47.78	330	7.094**
Pulses (g)	37.57±12.28	53.83±31.45	75	8.86**
Green leafy Vegetable(g)	33.13±22.74	31.43±12.93	100	1.08NS
Roots & Tubers (g)	35.17±24.63	34.63±18.89	200	0.316NS
Other veg. (g)	50.30±32.55	52.10±28.28	200	0.82NS
Condiments and spices (g)	19.80±7.49	23.54±8.56	---	5.057**
Nuts and oilseeds (g)	17.16±6.05	20.20 ±7.73	----	5.663**
Fruits (g)	35.35±22.98	28.59±15.85	100	4.146**
Milk and milk products (ml)	97.30±38.07	92.80±23.85	500	1.89NS
Fats & oil (g)	26.90±6.05	25.05±6.14	35	3.569**
Sugar & jaggery (g)	23.78±7.85	23.45±6.09	25	0.586NS

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

Table 3: Mean Nutrient intake of adolescent girls as per residing place (n=600)

Particular	Residing at Home	Residing in hostel	RDA	't' value
Energy (Kcal)	1649.78 ± 280.70	1671.43 ± 282.23	2440	0.94NS
Protein (g)	50.33 ± 10.02	47.92 ± 7.27	52.1	3.61**
Fat (g)	42.94 ± 13.87	44.38 ± 34.47	35	0.68NS
Iron (mg)	19.05 ± 5.11	20.71 ± 5.30	26	5.36**
Calcium (mg)	382.64 ± 149.81	404.54± 201.65	800	1.47NS
β-carotene (µg)	2212.43 ± 3184.86	1319.49 ± 2258.68	4800	4.08**
Thiamine(mg)	0.73 ± 0.44	0.81 ± 0.55	1	1.81NS
Riboflavin(mg)	0.82 ± 0.93	0.76 ± 0.25	1.2	1.14NS
Folic acid (mg)	176.24 ± 77.87	168.64 ± 58.53	150	1.35NS
Niacin (mg)	13.12 ± 11.02	12.82 ± 3.63	14	0.45NS
Vitamin C (mg)	38.23± 21.57	37.41 ± 15.41	40	0.53NS
Zinc (mg)	6.96 ±1.56	6.84 ± 5.42	12	0.35NS

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

Table 4: Percent adequacy of nutrient intake of selected adolescent girls as per residing place (n=600)

Particular	Residing at Home	Residing in Hostel
Energy (Kcal)	67.61	68.50
Protein (g)	96.60	91.97
Fat (g)	122.68	126.80
Iron (mg)	79.65	73.27
Calcium (mg)	47.83	50.57
B-carotene (µg)	46.09	27.49
Thiamine(mg)	73.26	80.72
Riboflavin(mg)	68.72	91.55
Folic acid (mg)	117.49	112.43

Niacin (mg)	93.68	63.44
Vitamin C (mg)	93.51	95.56
Zinc (mg)	57.02	57.96

Table 5 : Sign and symptom of anaemia observed among selected adolescent girls

(n=600)

The sign and symptom of anaemia	Residing at Home	Residing in hostel
Tiredness	215 (71.67)	160 (53.33)
Lethargy (lack of energy)	138 (46.00)	123 (41.00)
Shortness of breath (dyspnoea)	66 (22.00)	60 (20.00)
Headache	118 (39.33)	110 (36.67)
An altered sense of taste	49 (16.33)	84 (28.00)
Painful ulcers (open sores) on the corners of your mouth	10 (3.33)	25 (8.33)
A sore tongue	28 (9.33)	37 (12.33)
Feeling itchy	102 (34.00)	84 (28.00)
Hair Loss	165 (55.00)	186 (62.00)
Difficulty swallowing (dysphagia)	32 (10.67)	31 (10.33)
A pale complexion	60 (20.00)	89 (29.67)
An abnormally smooth tongue	41 (13.67)	96 (32.00)
Pica	62 (20.67)	85 (28.33)
Spoon-shaped nails	56 (18.67)	43 (14.33)
Coldness in the hands and feets	62 (20.67)	86 (28.67)
Poor concentration	98 (32.67)	155 (51.67)
Vomiting	33 (11.00)	17 (5.67)
Restless in legs syndrome	69 (23.00)	121(40.33)

Figure in parenthesis indicate percentage

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Comparative analysis of health status of selected 16-18 years adolescent girls

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Abstract
Present study is undertaken to assess health status of selected 16-18 years adolescent girls residing in Parbhani district, Maharashtra. Total 600 adolescent girls were selected from Parbhani district of Maharashtra state. Health status of selected adolescent girls 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. Health status was measured by assessing Body mass index. 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 revealed that as per age and income statistically non- significant difference was noted for all anthropometric measurements among different income group except hip: waist ratio of 16 years girls and waist circumference among 17 and 18 years girls. Whereas 61.32 percent and 60.13 percent girls of 16 years and 17 years were found to be normal whereas 18 years of girls were either mild, moderate degree of under nutrition and over nutrition. 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 for intake of fats and oils remaining foods were below than Recommended Dietary Allowances. Further the percent adequacy of cereal, pulses, sugar and jaggery found to be maximum followed by fats and oil seeds. While incase of nutrient intake it was observed that except fat and vitamin C remaining nutrient was below than Recommended Dietary Allowances. Whereas 100 percent nutrient adequacy noted for fat, folic acid vitamin c respectively.

Keywords: Health status, 16-18 years adolescent girls, anthropometric

Introduction
Adolescence is the future generation of any country. Their nutritional needs are critical for the wellbeing of a society but for many years, their health has been neglected because they are considered to be less vulnerable to diseases compared to relatively young children or the old people. Adequate nutrition and healthy eating and physical exercise habits at this age are foundations for good health in adulthood. If the adolescents are well-nourished, they can make optimal use of their skills, talents and energies and would be healthy and responsible citizens. 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 a reference standard for adolescents and there is a growth spurt which occurs with puberty which occurs at different ages. 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. Nutritional requirement in relation to body size is more during adolescence. Majority of the girls do not achieve their full height and weight potential on account of their dietary insufficiencies.
Adolescence, a second period of rapid growth may serve as an opportunity for compensating faltered early childhood growth though the potential for significant catch-up is limited. Adolescence, one of the nutritional stress period of life with profound grow comes with increased demands for energy, protein, minerals and vitamins such as vitamin B6, B9, B10, vitamin A and vitamin C.

Thiamine and riboflavin play essential roles in energy metabolism so are important in this cycle.

Often health and nutritional status of adolescent girls are direct reflection of the cumulative effects of physical growth, the onset of menarche and increase in fat and muscle mass which place extra nutrition requirements on them. Physical growth of adolescent girls integrately related to their dietary intake which is determined by availability of food in terms of quality and quantity and the ability to digest, absorb and utilize food. Food availability is influenced by dietary practices, cultural traditions, family structure, birth intervals, meal patterns, and food allocation. At the same time, digestion and absorption can be impeded by infection as a result of lack of environmental sanitation.

Changes in body dimensions reflect the overall health and welfare of individuals and populations. Anthropometry is used to assess and predict performance, health and survival of individuals and reflect the economic and social wellbeing of populations. Therefore present study under taken for comparative analysis of health status of selected 16-18 years adolescent girls residing in Parbhani district, Maharashtra.

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 district. Availability of adolescent girls was ascertained through visit to college, hostel and home. The anthropometric status of selected adolescent girls was determined by recording height (cm), weight (kg), mid upper arm circumference (cm), waist circumference (cm), hip circumference (cm) and hip: waist ratio. 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 adolescent girls as per age and income group

Data on anthropometric measurements i.e. height, weight and BMI of adolescent girls as per age and income group is presented Table 1A. It was observed that adolescent girls of 16years and 18years from income group Rs.<10,000 exhibits higher value for BMI, and income group Rs.>20,001 exhibited better value for height, weight for both the age groups of adolescent girls respectively. Further in case of girls of 17 years, it was noted that income group Rs. < 10,000/- exhibits more value for height, weight, whereas BMI was recorded more in income group Rs.10,001– 20,000/.In nutshell, It can be observed that measured anthropometrics parameters were below the NCHS standards.

Table1B. presented the data on anthropometric measurements viz. mid arm circumference, hip circumference and waist circumference and hip: waist ratio of adolescent girls as per age and income group. It is revealed from the table that adolescent girls from income group Rs.<10,000 exhibits higher value for mid upper arm circumference while adolescent girls belonging to income group Rs.10,001 to 20,000 showed higher value for hip: waist ratio and adolescent girls from income group Rs. >20,001 exhibited comparatively better value for waist circumference respectively. Statistically non-significant difference was noted among different income group except hip: waist ratio of 16 years girls and waist circumference among 17 and 18 years girls.

Table 1A: Anthropometric measurements of adolescent girls as per age and income group (n=600)

	16 years			17years			18years		
Income Group (Rs. Per month)	Height (cm)	Weight (Kg)	BMI (Kg/m²)	Height (cm)	Weight (Kg)	BMI (Kg/m²)	Height (cm)	Weight (Kg)	BMI (Kg/m²)
<10000	154.17	45.87	20.63	153.17	44.47	18.83	153.54	45.16	18.335
10001-20000	154.57	45.80	20.36	153.37	45.45	18.77	153.28	45.94	17.947
>20001	153.33	46.39	20.21	152.97	45.41	18.70	156.10	46.42	17.870
NCHC Standard	162.1	55.9	21.3	162.1	55.9	21.3	162.1	55.9	21.3
'f' value	0.598^{NS}	0.122^{NS}	0.526^{NS}	0.112^{NS}	0.880^{NS}	0.066^{NS}	1.946^{NS}	0.298^{NS}	0.719^{NS}
CD	----	---	----	---	---	---	---	---	---

Table 1B: Anthropometric measurements of adolescent girls as per age and income group (n=600)

	16 years				17 years				18 years			
Income Group (Rs.Per month)	MUAC (cm)	Hip circumference (cm)	Waist circumference (cm)	Hip /waist Ratio	MUAC (cm)	Hip circumference (cm)	Waist circumference (cm)	Hip /waist Ratio	MUAC (cm)	Hip circumference (cm)	Waist circumference (cm)	Hip /waist Ratio
<10000	22.68	80.25	66.45	0.80	22.72	77.55	65.05	0.87	23.50	79.84	70.86	0.87
10001-20000	22.63	79.63	65.98	0.87	22.86	78.50	67.02	0.88	22.77	77.93	71.28	0.91
>20001	23.26	81.47	67.70	0.83	22.82	77.48	70.17	0.86	23.05	73.75	80.21	0.87
'f' value	1.36^{NS}	0.57^{NS}	0.35^{NS}	3.79^{*}	0.11^{NS}	0.34^{NS}	4.66^{*}	0.10^{NS}	0.09^{NS}	2.88^{NS}	4.41^{*}	0.39^{NS}
CD	----	----	----	0.055	---	---	3.657	---	---	---	7.572	---

* - Significant at 5% level, NS- Non Significant

Prevalence of under nutrition in selected adolescent girls per age and family income group

Table 2 depicted the information on prevalence of under nutrition among selected adolescent girls as per age and income group. It was revealed that maximum adolescent (60.50 to 68.88%) among 16 years, (56.52 to 56.77%) among 17 years and (41.67 to 65.00%) among 18 years were found to be normal. Whereas 4.16 to 11.11 per cent, 5.79 to 6.14 per cent and 9.68 to 15.00 per cent among 16, 17 and 18 years adolescent were found to be in the category of severe grade of under nutrition. Further it was noted from the table that as the monthly income of the family increased per cent of normal girls increased from 60.50 per cent (Rs.<10,000 per month) to 68.88 per cent (Rs. >20,001 per month). However 8.88 per cent to 33.33 per cent girls were categorized as mild grade under nutrition followed by moderate grade under nutrition (8.88 to 22.58%). Irrespective of age and income negligible number of adolescent girls was observed obese.

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

Different grades of under nutrition	16 years			17 years			18 years		
	Income (Rs. Per month)			Income (Rs. Per month)			Income (Rs. Per month)		
	<10000	10001-20000	>20001	<10000	10001-20000	>20001	<10000	10001-20000	>20001
Sever	6 (5.04)	2 (4.16)	5 (11.11)	8 (6.77)	7 (6.14)	4 (5.79)	4 (11.11)	3 (9.68)	3 (15.00)
Moderate	11 (9.24)	6 (12.5)	4 (8.88)	13 (11.01)	13 (11.40)	9 (13.04)	5 (13.88)	7 (22.58)	0 (0.00)
Mild	28 (23.52)	8 (16.66)	4 (8.88)	28 (23.72)	28 (24.56)	15 (21.74)	12 (33.33)	3 (9.68)	3 (15.00)
Normal	72 (60.50)	30 (62.52)	31 (68.88)	67 (56.77)	64 (56.14)	39 (56.52)	15 (41.67)	15 (48.39)	13 (65.00)
Obese	2 (1.68)	2 (4.16)	1 (2.22)	2 (1.69)	2 (1.75)	2 (2.89)	0 (0.00)	3 (9.68)	1 (5.00)
Total	119	48	45	118	114	69	36	31	20

Figures in parenthesis indicate percentage

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.

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

Family income (Rs. per month)	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 & jiggery (g)
<10000	247.25±42.27	44.29±23.91	31.96±16.39	32.59±20.45	46.37±27.55	21.05±7.38	16.29±6.43	31.08±19.75	84.10±23.37	23.96±7.09	22.93±7.43
10001-20000	255.63±48.44	44.72±23.51	34.68±21.10	37.53±23.27	53.81±31.21	21.56±8.82	20.48±6.55	27.90±4.44	98.97±25.73	27.90±4.44	25.63±6.48
>20001	251.84±39.24	48.23±27.69	31.22±19.37	36.38±22.73	56.12±32.79	18.19±11.37	20.87±7.43	28.33±17.46	107.46±39.24	27.51±5.58	23.28±6.55
RDA	330	75	100	200	200	---	----	100	500	35	25
't' value 1 vs 2	1.67^{NS}	0.17^{NS}	1.28^{NS}	2.05*	2.29*	0.56^{NS}	5.97**	3.72**	5.51**	6.75**	3.70**
1vs 3	1.21^{NS}	1.62^{NS}	0.44^{NS}	1.89^{NS}	3.41**	1.96*	6.97**	1.60^{NS}	7.50**	6.10**	0.55^{NS}
2 vs 3	0.74^{NS}	1.22^{NS}	1.49^{NS}	0.44^{NS}	0.64^{NS}	0.99^{NS}	0.42^{NS}	6.02**	2.36*	0.69^{NS}	3.17**

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

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.

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

Particular	Vegetarian	Non-vegetarian
Cereals (g)	75.62	80.06
Pulses (g)	60.29	70.35
Green leafy Vegetable (g)	32.52	28.95
Roots & Tubers (g)	17.35	18.78
Other veg. (gm)	25.44	27.63
Fruits (g)	32.52	23.82
Milk and milk products (ml)	19.30	14.74
Fats & oil (g)	76.32	42.86
Sugar & jaggery (g)	94.30	97.90

Nutrient intake of adolescent girls as per income

Mean nutrient intake of adolescent girls as per income is presented in Table 5. It is revealed from the table among three income group higher values for the intake of energy (1680.75 kcal), fats (44.93 g), thiamin (0.87mg) and zinc (7.31mg) was recorded by adolescent girls belonging to low income group. In higher income group more nutrient intake was noted for iron (21.55 mg), calcium (493.26 mg), β-carotene (3480.61 µg), riboflavin (0.96 mg), niacin (13.43 mg), and vitamin C (44.11 mg) respectively. From the data it is revealed that among three income groups intake of fats and folic acid were above the recommended dietary allowances and remaining nutrients were below the recommended dietary allowances. When compared between low and middle income group statistically significant difference was observed for β-carotene, riboflavin folic acid, vitamin C and zinc. When compared between middle and higher income group statistical difference was noted for iron, calcium, β- carotene thiamine and vitamin C intake. However nutrient intake among low and high income adolescent was compared it was found that except protein, fat, folic acid, niacin, thiamin and zinc, other nutrients exhibits statistically significant difference.

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 vs 17 years	16 vs 18 years	17 vs 18 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

Per cent adequacy of nutrients intake of selected adolescent girls as per age

Per cent adequacy of nutrients intake of selected adolescent girls as per age is presented in Table 6. The highest per cent adequacy of nutrient was noted as per age for fat (119.29 – 132.77%), followed by folic acid (102.89- 122.85%). However more than 50 per cent adequacy was recorded for vitamin C, niacin, protein, iron, calorie and riboflavin (76.41-119.04%, 87.89-101.50%, 93.16-94.73%, 73.39-89.21%, 65.17-69.48% and 56.47-94.68%). Further it was also observed that least per cent adequacy was noted for β-carotene (18.33- 98.45%) followed by calcium (46.70-62.77%).

Table 6: Percent adequacy of nutrient intake of adolescent girls as per age (n=600)

Particular	16 years	17 years	18 years
Energy (Kcal)	67.32	69.49	65.17
Protein (g)	94.14	94.73	93.16
Fat (g)	128.87	119.29	132.77
Iron (mg)	75.22	73.39	89.21
Calcium (mg)	46.79	46.70	62.77
β-carotene (µg)	18.33	30.85	98.45
Thiamine(mg)	79.45	83.23	51.21
Riboflavin(mg)	56.47	64.07	94.68
Folic acid (mg)	102.89	121.15	122.85
Niacin (mg)	95.35	87.89	101.50
Vitamin C (mg)	109.21	76.41	119.04
Zinc (mg)	61.48	55.24	55.54

Discussion

Result revealed that the highest and lowest value for height and weight was 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. 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.

More percent of normal girls were 16 years and majority of 18 years adolescent girls were categorized under the grade of mild, moderate and overweight, while 17 years girls were suffering with severe under nutrition. The studies conducted in Maharashtra state by Zavar and R. Devi (2008) [9], Mane *et al.* (2012) [6], Jawarkar *et al.* (2015) [4] 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.

As per age it was also 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 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) [8] 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 is crystal clear from

the result that the percent adequacy of cereal, pulses, sugar and jaggery found to be maximum followed by fats and oil seeds.

As per age it was also noticed that intake of minerals, vitamins and fat was found to be high among adolescent girls belonging to 18 years, intake of thiamine 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) [8] 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) [7] 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 that Recommended Dietary Allowances which was in line with present study. When consider age wise, food habit and income wise per cent 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) [2] 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 respectively. The intake of vitamin A, vitamin B6 and Zinc was less than 20 per cent adequate.

Conclusion

It is necessary to give proper education about dietary intake as per age to adolescent girls and their mothers also.

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Research Article

PREVALENCE OF UNDER NUTRITION ASSOCIATED WITH SOCIO DEMOGRAPHIC CHARACTERS

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ABSTRACT

Astudy was carried out to find outprevalence of undernutrition associated with socio demographic charactersamong selected 600 adolescent girls of 16-18years from Parbhani district, Maharashtra. Total 600 adolescent girls i.e.300 each from urban and rural area of Parbhani district of Maharashtra state was covered. Further from both areas 150 each were randomly selected from hostel and residing at home. Information about socio economic background was collected through pre designed questionnaire.prevalence of under nutrition was assessed by BMI. Body Mass Index was calculated using value of height and weight. On the basis of BMI, adolescent girls were categorized into different grades of under nutrition.The finding of study showed that Almost 40 percent of each adolescent girls from 16 and 17 years were residing at hosteland 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.As per area,age, food habit and family income level showed that 5.00 to 71.62 per cent of girls were normal while remaining were suffering with one or other degree of under nutrition. As per area,age, food habit and family income level showed that 5.00 to 71.62 per cent of girls were normal while remaining were suffering with one or other degree of under nutrition. Maximum per cent of normal girls were from rural area while urban girls were suffered with one or other grade under nutrition. As per age61.32 percent and 60.13 percent girls of16 years and 17 years were found to be normal whereas 18 years of girls were either mild, moderate degree of under nutrition and over nutrition.When seen impact of food habit on degree of under nutrition 50 percent each urban girls from vegetarian and non vegetarian groupfound to be normal whereas 63.79 percent and 100 per centgirls from vegetarian rural adolescent girls were found to normal followed by mild grade (21.42 to 22.05 %) and moderate grade(9.31 to 14.33 %).When considering family income as per area it was noted 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.As per age61.32 percent and 60.13 percent girls of16 years and 17 years were found to be normal whereas 18 years of girls were either mild, moderate degree of under nutrition and over nutrition.When seen impact of food habit on degree of under nutrition 50 percent each urban girls from vegetarian and non vegetarian groupfound to be normal whereas 63.79 percent and 100 per centgirls from vegetarian rural adolescent girls were found to normal followed by mild grade (21.42 to 22.05 %) and moderate grade(9.31 to 14.33 %).When considering family income as per area it was noted 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.

INTRODUCTION

The term adolescent means 'to emerge' or 'achieve identity.' Adolescence is defined as a phase of life characterized by rapid physical growth and development, physical, social and psychological changes and maturity, sexual maturity.

The assessment of pattern ofgrowth during the adolescent period is based on a set of standard physical or anthropometric measurements. These measurements not only indicate the general pattern of growth during adolescent period, but also reflect a population specific growth pattern, which can serve as models for the nutritional assessment of the population. Changes in physical size and shape during the adolescent period can be inferred from various physical traits. Anthropometric measurements help in the assessment of nutritional status and monitor changes in growth of adolescents.

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Measurements of height, weight and nutrient intake are the reliable means to evaluate the nutritional status and it is very much in need.Under-nutritionamong adolescents is a serious public healthproblem internationally, especially indeveloping countries. Undernutrition in these girls is associated with reduced lean mass, lack of muscular strength and decreased work capacity. In adolescent girls, short stature that persists into adulthood is associated with increased risks of adverse reproductive outcomes.Therefore , this study was conducted to find out the prevalence of under nutrition and its associated with socio demographic characters among selected 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 district.Information about socio economic background was collected through personnel visit to college, hostel and home by personal interview method with a pre-planned questionnaire.Prevalance of under nutrition was determind by Body Mass Index. The body mass index (BMI) was calculated by using by formula,(Shrilaxmi 2005).

$$BMI = \frac{\text{Weight (kg)}}{\text{Height2 (m)}}$$

On the basis of BMI, adolescent girls were categorized into different grade of under nutrition

Classification	BMI(kg/m^2)
Underweight	<18.5
Normal weight	18.50-24.99
Over weight	>25.00

RESULT

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 percent 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 centand 0.67 per cent were from joint and extendedfamilies. 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 27per cent and 26 per cent hostel were belonging to income groupRs. 10,001 to 20,000 per month whereas girls residing at home (18.67%) and residing at hostel (24.33 %) were belonging to income groupRs.>20,001 per month respectively.

Prevalence of under nutrition among selected adolescent girls

Prevalence of under nutrition among selected adolescent girls based upon body mass index is presented in Table 2. When compared area wise almost equal per cent of adolescent were suffering with mild and moderate grade of under nutrition which was comparatively more than rural girls. However 35.63 per cent adolescent from 18 years of age group reported mild grade of under nutrition followed by 16 years of girls (23.11%) further it was also reported that non vegetarian girls were categorized as eithermild, moderate or severe grade of under nutrition. In the same way it was also noted from the table that maximum girls from high income reported mild grade under nutrition.

Prevalence of under nutrition among selected urban and rural adolescent girls as perage

Prevalence of under nutritionin the selected adolescent girls per age and areais 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 asobese (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.

Prevalence of under nutrition among selected urban and rural adolescent girls as per food habits

Table 4.reported about prevalence of under nutrition among selected urban and rural adolescent girls as per food habits. Almost 50 per cent urban girls belonging to vegetarian and non vegetarian group were found to be normal, whereas 100 per cent and 63.79 per cent rural adolescent girls of both food habits were found to normal. Mild grade ofunder nutrition was noted among urban adolescent (21.42 to 22.05 %) whereas none to 21.22 percent rural girl reported mild grade of under nutrition. Whereas (14.33 to 10.71 %) urban adolescent of both area exhibited moderate grade of under nutrition and 10.29 and 10.71 per cent reported sever under nutrition. On the contrary none of rural girls belonging to non vegetarian food habits does not record any type of malnutrition.

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

Table 5 revealed the information on prevalence of under nutrition 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. Whereas8.84 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.

Prevalence of under nutrition in selected adolescent girls per age andfamily income group

Table6 depicted the information on prevalence of under nutrition among selected adolescent girls as per age and income group. It was revealed that maximum adolescent (60.50 to 68.88 %)among 16 years, (56.52 to 56.77 %)among 17 years and (41.67 to 65.00 %)among 18 years were found to be normal. Whereas 4.16 to 11.11 per cent, 5.79 to 6.14 per cent and 9.68 to 15.00 per cent among 16, 17 and 18 years adolescent were found to be in the

ategory of severe grade of under nutrition. Further it was oted from the table that as the monthly income of the family ncreased per cent of normal girls increased from 60.50 per cent (Rs.<10,000 per month)to 68.88 per cent (Rs. >20,001 per month). However 8.88 per cent to 33.33 per cent girls were categorized as mild grade under nutrition followed by moderate grade under nutrition (8.88 to 22.58 %). Irrespective of age and income negligible number of adolescent girls was observed obese.

DISCUSSION

Majority of girls residing at home hostel were16 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. These studies are in line with present study.Irrespective of area majority families were nuclear. Zanvar*etal*(2007) conducted study in Marathwada zone of Maharashtra state reported that 80.6 per cent selected adolescent girls were from nuclear family and 68 per cent girls were having 4-6 member in family. 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), Zanvar and Rohini Devi (2008) reported that 62.5 per cent girls were vegetarian. Further it was observed that more per cent of families of adolescent girls with income Rs.<10,000/- (52 percent) per month followed by Rs.10,001-20,000/- (26.5 percent) per month and while approximately 21.5 per cent adolescent girls were belonging to monthly income > 20,001/- per month. Gaiki and Wagh (2014) observed that 60 per cent girls were from lower economic class and remaining were either middle class or upper social class whereas Bina*etal* (2015) conducted cross sectional survey at Aurangabad, Maharashtra reported that 52.64 per cent girls were belonging to upper lower status.

Influence of socio economic factors on prevalence of under nutrition revealed in Table (2 to 6). Perusal of tables 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. 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. More percentage of vegetarian girls was normal and overweightalsowhile non vegetarian girls were suffered from one or more degree of under nutrition. Further it was noted that irrespective offamily income, almost 66.3 to 69.4 percent girls were normal from .The studies conducted in Maharashtra state by Mane *etal* (2012), Jawarkar*etal* (2015) also reported that majority of participant were belonging to normal category.The more percentage of girls was 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 playingand 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.

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

Sr.No.	Particular	Residing at home	Residing at hostel	Total
		Area		
1	Urban	150 (50)	150 (50)	300(50)
	Rural	150 (50)	150 (50)	300 (50)
		Age		
2	16yrs	162 (54)	121 (40.33)	283 (47.17)
	17yrs	122 (40.67)	121 (40.33)	243 (40.5)
	18yrs	16 (5.3)	58 (19.33)	74 (12.33)
		Type of family		
3	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)
		No. of family member		
4	4-6 members	187 (62.33)	163 (54.33)	350 (58.33)
	>6 members	113 (37.33)	137 (45.67)	250 (41.67)
		Food habits		
5	Vegetarian	276 (92)	286 (95.30)	562 (93.67)
	Non- vegetarian	24 (8)	14 (4.67)	38 (6.33)
		Family income		
6	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 Prevalence of under nutrition among selected adolescent girls

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 (59.54)	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

Figure in parenthesis indicate percentage

Table 3 Prevalence of under nutrition among selectedurban and ruraladolescent as perfood habit(n=600)

Different grades of under Nutrition	Urban		Rural	
	Vegetarian	Non-vegetarian	Vegetarian	Non-vegetarian
Severe	28 (10.29)	3 (10.71)	10 (3.44)	0 (0.00)
Moderate	39 (14.33)	3 (10.71)	27 (9.31)	0 (0.00)
Mild	60 (22.05)	6 (21.42)	63 (21.72)	0 (0.00)
Normal	137 (50.36)	14 (50.00)	185 (63.79)	10(100.00)
Obese	8 (2.94)	2 (7.14)	5 (1.72)	0 (0.00)
Total	272	28	290	10

Figures in parenthesis indicate percentage.

Table 4 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 5 Prevalence of under nutrition among selected adolescent girls per age and family income group (n=600)

Different grades of under nutrition	16 years			17 years			18 years		
	Income (Rs. Per month)			Income (Rs. Per month)			Income (Rs. Per month)		
	<10000	10001-20000	>20001	<10000	10001-20000	>20001	<10000	10001-20000	>20001
Sever	6 (5.04)	2 (4.16)	5 (11.11)	8 (6.77)	7 (6.14)	4 (5.79)	4 (11.11)	3 (9.68)	3 (15.00)
Moderate	11 (9.24)	6 (12.5)	4 (8.88)	13 (11.01)	13 (11.40)	9 (13.04)	5 (13.88)	7 (22.58)	0 (0.00)
Mild	28 (23.52)	8 (16.66)	4 (8.88)	28 (23.72)	28 (24.56)	15 (21.74)	12 (33.33)	3 (9.68)	3 (15.00)
Normal	72 (60.50)	30 (62.52)	31 (68.88)	67 (56.77)	64 (56.14)	39 (56.52)	15 (41.67)	15 (48.39)	13 (65.00)
Obese	2 (1.68)	2 (4.16)	1 (2.22)	2(1.69)	2 (1.75)	2 (2.89)	0 (0.00)	3 (9.68)	1 (5.00)
Total	119	48	45	118	114	69	36	31	20

Figures in parenthesis indicate percentage

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RESEARCH ARTICLE

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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 girlswas 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 were154.44± 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/m^2 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/m^2 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/m^2 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: Prevulence 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 4revealed 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)
	Extended	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/m2)	Height (cm)	Weight (kg)	BMI (kg/m2)	Height (cm)	Weight (kg)	BMI (kg/m2)
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**	0.17NS	12.67**	0.38NS
Rural	24.66**	11.21**	7.70**	24.65**	10.49**	3.55**	13.96**	9.70**	1.98NS

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

Table 3. Prevalence of under nutrition among selectedadolescent 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 (59.54)	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 selectedadolescent 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	0.55NS
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	---	1.06NS
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	0.65NS
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	0.87NS

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 (54.15 ± 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	1.47NS
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	0.96NS
Niacin (mg)	12.93±4.32	13.00±10.77	14	0.12NS
Vitamin C (mg)	39.11±22.14	36.52±14.47	40	1.62NS
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 were16 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*etal* (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 that Recommended Dietary Allowances. However these studies were in line with the present study.

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

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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 µg), 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 - 20,000whereas 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/m^2.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/m^2 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 µg), 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 µg), 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 that 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 *etal* (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 that Recommended Dietary Allowances which was in line with present study.

As the studied girls were from Marathwada zone and the impact ofsocio 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 etal (2006) conducted study at Dharwad taluka, Karnataka statereported that the adequacy of protein intake was 46 and 44 per cent and that of vitamin B12 was 54 and 49 per 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 circum-ferance (cm)	Waist Circum-ferance (cm)	Hip /waist ratio	Height (cm)	Weight (Kg)	BMI (Kg/m^2)	MUAC (cm)	Hip circum-ferance (cm)	Waist circum-ferance (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
'f' 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}	1.92^{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

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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 (µg)	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

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A study on Commonly Observed Deficiency Symptoms among Adolescent Girls

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Abstract

The present research was undertaken to find out commonly observed deficiency symptoms and hygienic condition, personal hygiene among selected 16-18 years adolescent girls . Total 600 adolescent girls i.e.300 each from urban and rural area of Parbhani district of Maharashtra state was covered. Further from both areas 150 each were randomly selected from hostel and residing at home. Information about socio economic, educational & professional background of selected adolescent girls and commonly observed deficiency symptoms, sanitation, health and hygienic condition were also assessed by personal interview method through pre designed questionnaire. The finding of study revealed that almost 40 per cent of each adolescent girls from 16 and 17 years were residing at hostel and 54.00 percent and 40.67 per cent of 16 and 17 years were residing in home whereas around 20 percent and 5.3 per cent girls of 18 years were residing at hostel and home. Almost 80 percent girls from both residing places were belonging to nuclear family. Around 58.33 percent girls having 4-6 family members and 93.67 per cent adolescent girls were vegetarian. From both residing places majority were belonging to low income group followed by middle income group. As per the educational background and parents occupation 33.00 and 23.33 percent mothers were high school educated and on the other hand half of fathers were college educated (51 and 50.33 %) from both the group. Very high per cent of mothers were house wives in both group i.e. residing at home (90.33 %) and residing at hostel (79 %).Whereas more numbers of fathers were farmers (70.33 % girls residing at home and 82.67% girls residing at hostel). Irrespective of place of residing in urban area almost all girls were staying in constructed pakka house and 63.3 per cent rural girls were staying in partially kaccha and pakka house. However 100 per cent sanitary and toilet facility was available at hostel in urban and rural area whereas girls residing at home in rural area 64.0 per cent had sanitary facility and toilet facility. However 36.0 per cent girls reported that sanitary facility and toilet facility was not available at their residing place. Further it was noted that 100 percent adolescent followed personal hygiene practices like washing of hands and legs after toilets, washing their hands using soap after toilet, used sleeper for toilet, taking bath regularly, cuts nail regularly, using foot ware when go outside and wash their legs and hands after coming outside. Availability of drinking water facility was better in both areas irrespective of residing places. Commonly observed deficiency symptoms among girls residing in both areas were hair sparse (73.00 and 80.33 %), hair easily plucked (65.33 and 75.00 %), hair discoloured (49.33 and 53.33 %), oedema (7.33 and 31.33 %).The other deficiency symptoms like emaciation, koilonychias, cheilosis and other vitamins deficient problems (0.33-12.33 %) respectively.

Introduction:

Adolescence – a period of transition between childhood and adulthood is a significant period of human growth and maturation. Adolescent's growth and development is closely linked to the diet they receive during childhood and adolescence. A good diet has a tremendous bearing on a person's vitality emotional stability and enthusiasm for life. An individual who is well nourished protrude this fact in his personal appearance. Inadequate diet and unfavourable environmental condition in developing nations like India may adversely affect the growth and nutrition of adolescents. Malnutrition, both under nutrition and over nutrition, refers to an impairment of health, resulting from a deficiency or from an excess or imbalance of nutrients. Modernization, change in lifestyle, stress and strain, improper eating habits, faster pace of life, less physical exercise etc., are creating conditions that affect the health of adolescents leading to chronic disorders. In these circumstances, both in the advanced countries and in the metropolitan cities of India, with the changing life style the normal traditional pattern of food become inappropriate. This is considered to be one of the basic reasons leading to food related health problems (Chandrasekhar and Acharya., 1989).

There has been ample evidence to demonstrate how the socio-demographic factors such as age, race, ethnicity, language, socioeconomic status, and education, can influence health and nutritional outcomes. Ever-increasing evidence suggests that the health and nutritional status of a population are greatly determined by the social and economic circumstances of that population, as well as its access to health care services. Hence considering the above facts the present research work was undertaken to find out commonly observed deficiency symptoms and hygienic condition, personal hygiene among adolescent girls from parbhani district of Maharashtra state

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 each from urban and rural area of Parbhani district. Equal number of adolescent girls i.e. 150 each residing at home and in hostel were covered from both urban and rural area. Information regarding socio- economic status, commonly observed deficiency symptoms, sanitation, health and personnel hygienic practices of adolescent girls was collected through personnel visit to college, hostel and home by personal interview method with a pre-planned questionnaire. The collected data was tabulated and analyzed statistically by applying different suitable tests.

Result and Discussion:

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.

Hygienic Condition at Residing Places of Selected Adolescent Girls as Per Area:

Table2. Depicted information regarding hygienic condition at residing places of selected adolescent girls as per area.Irrespective of area the girls residing in hostel were staying in pakka house as hostel were well constructed. However 60.7 per cent girls from urban area were residing in pakka house and 63.3 per cent rural girls residing at home were residing in partially kaccha and pakka house. Further it was observed that in urban and rural area 100 per cent sanitary and toilet facility was available at hostel whereas in rural area 64.0 per cent girls residing at home had sanitary and toilet facility and 36.0 girls reported that sanitary and toilet facility was not available at their residing place. It was noted that in urban area almost 100 per cent girls from both residing place having proper drainage facility while in rural area 90.7 and 100 per cent girls from both residing place having proper drainage. Further it was noted that majority of girls (93.3 to 96.7 %) from both area reported that stagnated water was not around at their living places.

Personal Hygiene Practices Followed by Selected Adolescent Girls at Residing Places as Per Area:

Information regarding personal hygiene practices followed by selected adolescent girls at residing places as per area is presented in Table 3. Data revealed that all the studied adolescent girls followed personal

hygiene practices like washing of hands and legs after toilets. Almost all of the selected girls reported that they used soap for washing their hand after toilet. Only 1.3 to 7.3 per cent used ash and mud for washing hand. Hundred per cent selected adolescent girls used sleeper for toilet, taking bath regularly, cuts nail regularly, using foot ware when go outside and wash their legs and hand after coming outside.

Drinking Water Facility Available at Residing Places as Per Area:

Information on availability of drinking water facility at residing places as per area is depicted in Table 4. It is revealed from the table that irrespective of area of residing majority of hostel girls reported that they used well and hand pump as a source of drinking water. Contrary majority of girls residing at home in both areas were using tap water further it was also reported that all studied hostelite girls were used filtered water for drinking purpose as water filter were fixed at hostel. Where ever almost 50 per cent urban girls residing at home used filter water for drinking and remaining were either filter water using muslin cloth (40 %) and sieve (10 %) and in same fashion rural girls residing at home were using filter water for drinking (29.3 %). It was noted that 100 per cent urban and rural girls residing at hostel using plastic bottle to store water in room. Contrary the girls staying in home were either used steel container (44.7 and 46.7 %), Mud pot (matka) (28.0 and 35.4 %) and bib plastic container (20 and 25.3 %) respectively.

Commonly Observed Deficiency Symptom in Selected Adolescent Girls:

It is inferred from the Table 5 that the girls reported about commonly observed deficiency symptom hair sparse (73.00 to 80.33 per cent) followed by hair easily plucked 65.33 to 75.00 per cent and hair discoloured (49.33 to 53.33 %) whereas edema, emaciation and cheilosis (7.33 to 31.33, 5.33 to 12.33 and 8.33%) where as very few reported about other health problems. When seen critically it is observed from table that majority of girls residing at home were having one or other problems as compared to hostelite girls.

Discussion:

It was noted that hostel girls irrespective of area were reside in constructed hostel whereas 60.7 per cent girls residing at home from urban area residing in pakka house and 63.3 per cent rural girls residing at home were residing at partially kaccha and pakka house. Almost 100 per cent sanitary and toilet facility were available at hostel and in rural area 64.0 per cent had sanitary and toilet facility who were residing at home. In both areas the proper drainage facility was available at residing places. Further it was noted that 100 per cent adolescent followed personal hygiene practices like washing of hands and legs after toilets, washing hands using soap after toilet, using sleeper for toilet, taking bath regularly, cuts nail regularly, using foot ware when go outside and wash their legs and hand after coming outside. Availability of drinking water facility was better in both areas irrespective of residing places. It may be because of awareness about health cleanliness and social media like TV plays important role in health awareness and proper hygienic habits among girls. Important topics like this might have covered in school also which shows 100 per cent studied adolescent were careful about their health and hygiene practices adopted. Overall it was noticed that hair sparse, hair easily plucked and hair discoloured was commonly observed deficiency problem in selected adolescent girls. Other deficiency symptoms observed among girls residing in both areas it was edema, emaciation, koilonychias, cheilosis and other vitamins deficient problems (0.33-31.33 %). Such observed deficiency symptom were related to deficient diet in carbohydrate, protein, fat, iron and vitamins which leads to develop nutritional deficiency problems whereas hair sparse, hair easily plucked and hair discolored related with protein and iron deficiency, stress, disturbed sleep pattern, use of hard water for washing hairs and attraction towards use of various shampoos. The reason behind these deficiency may be the hostel girls consumed the food as prescribed to them by management and were not having choice to refuse it. Contrary girls staying at home were having choices and preferences and may be fussy about food. The girls residing at home were irregular about the timing of each meal as they go outside for school / college and coaching's and may carry tiffin's. However girls residing in hostel had facility of class / school and coaching within same campus. This might be associated factor of such outcome of results. Bhattacharyya and Barua (2013) conducted study at Dibrugarh town, Assam reported that commonly prevalent nutritional disorders among girls were Pallor (93.30%), menstrual problems (83.09%), dental caries (42.25%), angular stomatitis (35.56%), glossitis (34.15%), skin problems (20.07%), lymphadenopathy (10.21%), diarrhoea (7.04%), goitre (4.22%)and bitot's spots (0.35%) respectively. Zanvar V.S (2016) carried out study on adolescent girls from Marathwada zone on adolescent girls reported that commonly observed health problem among adolescent girls was weakness (64.80 to 70.40 %) followed by backache (36.4 to 36.00 %), headache (30 %) and fatigue (24.8 to 31.6%) respectively.

Conclusion:

Nutritional deficiency among adolescent girls is a public health significance among adolescents across the world the nutritional status of adolescent girls, the future mothers, contributes significantly to the nutritional status of the community. So it is necessity to conducted

awareness campaign regarding food and nutrition, health, surrounding sanitation and personnel hygiene practices.

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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

Table2: Hygienic Condition at Residing Places of Selected Adolescent Girls as Per Area

(N=600)

	Urban		Rural	
Hygienic Condition	**Home**	**Hostel**	**Home**	**Hostel**
Type of house				
Kaccha house	17 (11.3)	---	25 (16.7)	----
Partialy Kaccha house and Pakka house	42 (28.0)	----	95 (63.3)	----
Pakka house	91 (60.7)	150 (100)	30(20.0)	150 (100)
Sanitary and latrine facility				
At home	150 (100)	150(100)	96 (64.0)	150 (100)
Outside home	----	---	54 (36.0)	----
Proper drainage facility at residing place				
Yes	147 (98.0)	150 (100)	136(90.7)	150(100)
No	3 (2.0)	-----	14 (9.3)	----
Stagnated water is around at living place				

Yes	10 (6.7)	----	5 (3.3)	----
No	140 (93.3)	144 (96.0)	145 (96.7)	143(95.33)

Figure in parenthesis indicate percentage

Table 3: Personal Hygiene Practices Followed By Selected Adolescent Girls at Residing Places as Per Area (N=600)

	Urban		Rural	
Personal hygiene	**Home**	**Hostel**	**Home**	**Hostel**
Washing of hand and legs after toilet				
Yes	150 (100)	150(100)	150 (100)	150 (100)
No	----	----	----	----
Washing hand after toilet with				
with soap	148 (98.7)	150(100)	136 (90.7)	150 (100)
with mud	----	----	3 (2.0)	----
with ash	2(1.3)	----	11 (7.3)	----
with water	----	----		----
never wash	----	----	----	----
Use sleeper for toilet				
Yes	150 (100)	150(100)	150 (100)	150 (100)
No	----	----	----	----
Take bath daily				
Yes	150 (100)	150(100)	150 (100)	150 (100)
No	----	----	----	----
Cutting of nails regularly				
Yes	150 (100)	150(100)	150 (100)	150 (100)
No	----	----	----	----
Wear footwear while going outside				
Yes	150 (100)	150(100)	150 (100)	150 (100)
No	----	----	----	----
Washing hand and legs after coming outside				
Yes	150 (100)	150(100)	150 (100)	150 (100)
No	----	----	----	----

Figure in parenthesis indicate percentage

Table 4: Drinking Water Facility Available at Residing Places as Per Area (N=600)

Drinking water facility	Urban		Rural	
	Home	Hostel	Home	Hostel
Source of drinking water				
Tap water	96 (64.0)	----	52 (34.7)	----
Well	18 (12.0)	81 (54.0)	14 (9.3)	80 (53.3)
Hand pumps	36 (24.0)	69 (46.0)	83 (55.3)	70 (46.7)
Type of drinking water				
Filtered water	74 (49.3)	150(100)	44 (29.3)	150(100)
Filter through muslin cloth	60 (40.0)	----	51 (34.0)	----
Through sieve	16 (10.6)	----	43 (28.7)	----
Not filtered	----	----	-----	----
Storage of drinking water				
Mattaka	42 (28.0)	----	53 (35.4)	----
Steel container	70 (46.7)	----	67 (44.7)	----
Plastic container	38 (25.3)	150(100)	30 (20)	150(100)

Figure in parenthesis indicate percentage

Table 5: Commonly Observed Deficiency Symptom in Selected Adolescent Girls (N=600)

Deficiency Symptom	Residing at Home (n=300)	Residing in hostel (n=300)
Hair sparse	241 (80.33)	219 (73.00)
Hair discoloured	148 (49.33)	160 (53.33)
Hair easily plucked	225 (75.00)	196 (65.33)
Edema	22 (7.33)	94 (31.33)
Emaciation	16 (5.33)	37 (12.33)
Conjunctival xerosis	10 (3.33)	6 (2.00)
Bitot's spots	6 (2.00)	1 (0.33)
Corneal xerosis	5 (1.67)	1 (0.33)
Keratomalacia	8 (2.67)	2 (0.67)
Corneal opacity	2 (0.67)	0 (0.00)
Night blindness	4 (1.33)	2 (0.67)
Angular stomatitis	14 (4.67)	2 (0.67)
Cheilosis	25 (8.33)	25 (8.33)
Tongue : Red and Raw	17 (5.67)	22 (7.33)
Tongue: Rapillae atrophic	13 (4.33)	7 (2.33)
Phrynoderma	14 (4.67)	7 (2.33)
Koilonychia	36 (12.00)	6 (2.00)

Figure in parenthesis indicate percentage

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Screening of adolescent girls for nutritional status as per food habit

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Abstract:

The present study was undertaken to screen the nutritional status of selected adolescent girl as per food habit. 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. BMI 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 revealed that the influence of food habit as anthropometric measurement of adolescent girls no specific effect was noted in urban and rural girls with respect to height and weight. Significant difference was observed only for MUAC of urban girls. More percentage of vegetarian girls was normal and overweight also while non vegetarian girls were suffered from one or more degree of under nutrition. Mean food intake of cereals, pulses, roots and tubers, other vegetables, condiment and spices, sugar and jaggery were found to be more among non-vegetarian adolescent contrary intake of green leafy vegetable, nuts and oilseed, fruits, milk and milk products, fats and oils was recorded more among vegetarian girls. The similar trend was noted for percent adequacy of food intake for both food habits. But the consumption of food intake was below the ICMR recommendation. Significant difference was noted for intake of energy, β- carotene, riboflavin, niacin, vitamin C and zinc. However nutrient intake was found to be lower than Recommended Dietary Allowances except for fat, folic acid and vitamin C. High per cent adequacy was observed for fat followed folic acid and niacin whereas lowest per cent adequacy noted for β-carotene and calcium Per cent adequacy for other nutrient intake was more than 59 per cent among the adolescent girls belonging to both groups.

Introduction:

Adolescents are full of energy having a significance drive and new ideas. They are a positive force for a nation and are responsible for its future productivity. 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 . 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 remodelling 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. Growth of adolescent can be assessed by anthropometric measurements i.e. by height, weight, mid upper arm circumference, hip: waist ratio and 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.

Good nutrition promotes the production and activities of growth hormones, which influences the metabolism of proteins, carbohydrates, fat, mineral and promotes nitrogen retention. Biologists and nutritionists have charted the effect of nutritional deficiencies on the human growth profile. Fatal malnutrition, especially when combined with poor nutrition during infancy and early childhood, may lead to substantial permanent stunting, even if nutrition improves at later ages. Short periods of under nutrition during adolescence merely delay the adolescent growth spurt. A lack of adequate nutrition hinders such natural pattern and causes stunted physical growth accompanied by physiological abnormalities or even retarded mental development. If under nutrition is prolonged, moderate growth will continue beyond the age at which the growth of well-fed adolescents ceases. Hence, average size at birth, the average age at which growth spurt peaks, the average age at which growth terminates, the mean height during adolescent ages and the mean final height are all indicators of mean nutritional status.

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 refers 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 *etal* 2013). Adequate nutrition and healthy eating and physical exercise habits at this age are foundations for good health in adulthood. If the adolescents are well-nourished, they can make optimal use of their skills, talents and energies and would be healthy and responsible citizens. In point of this present study was undertaken for screening of selected adolescent girl nutritional status as per food habit.

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 district. Availability of adolescent girls was ascertained through visit to college, hostel and home. Using standard procedures anthropometry (Jelliffee,1996 and WHO 1995) measurements of height (cm), weight (kg), mid- upper arm circumference (cm), waist- hip ratio of the selected 600 adolescent girls were recorded and compared with NCHS (1977) reference values.

The body mass index (BMI) was calculated by using by formula,(Shrilaxmi 2005)

$$BMI = \frac{\text{Weight (kg)}}{\text{Height}^2 \text{ (m)}}$$

On the basis of BMI, adolescent girls were categorized into different grade as below

Classification	BMI(kg/m^2)
Underweight	<18.5
Normal weight	18.50-24.99
Over weight	>25.00

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).

Result and discussion:

Anthropometric measurements of selected urban and rural adolescent girls as per different food habit

Anthropometric measurements of selected adolescent girls as per area and food habit were presented in Table 1. Anthropometric measurements of urban vegetarian and non vegetarian girls i.e. height (154.98 & 154.71 cm), weight (45.85 & 47.32 kg), BMI (19.25 & 18.28 kg/m2), mid upper arm circumference (23.14 & 23.87 cm), hip circumference (78.25 & 79.66 cm), waist circumference (72.27 & 76.68 cm), hip: waist ratio (72.27 & 76.68 cm) respectively. On the other side rural vegetarian and non vegetarian adolescent exhibits various anthropometric measurements were height (152.35 & 152.60 cm), weight (44.73 & 46.40 kg), BMI (19.69 & 17.35 kg/m2), mid upper arm circumference (19.69 &17.35 cm), hip circumference (78.68 &83.65 cm), waist circumference (62.84 & 63.95 cm) and hip: waist ratio (0.80 & 0.77 cm) respectively. However when considered statistically non-significant influence of food habit was noted for all studied parameter in both urban and rural area except for MUAC in urban girls which was significant at 5 per cent level.

evalence of under nutrition among selected urban and rural adolescent girls as per food habits

Table 2 reported about prevalence of under nutrition among selected urban and rural adolescent girls as per od habits. Almost 50 per cent urban girls belonging to vegetarian and non vegetarian group were found to be rmal, whereas 100 per cent and 63.79 per cent rural adolescent girls of both food habits were found to normal. ild grade of under nutrition was noted among urban adolescent (21.42 to 22.05 %) whereas none to 21.22 ercent rural girl reported mild grade of under nutrition. Whereas (14.33 to 10.71 %) urban adolescent of both area hibited moderate grade of under nutrition and 10.29 and 10.71 per cent reported sever under nutrition. On the ontrary none of rural girls belonging to non vegetarian food habits does not record any type of malnutrition.

Mean food intake of selected adolescent girls as per food habit

The information regarding mean intake of food as per food habit is presented in Table 3. The consumption of cereals, pulses, roots and tubers, other vegetable and sugar was more among selected non-vegetarian adolescent girls. On the other hand among selected vegetarian adolescent girls consumption of green leafy vegetable, nuts and oilseeds, fruits, milk and milk products, fats and oils was found to be more. Whereas consumption of sugar and jaggery was almost equal among both the group adolescent girls. The recorded value of consumption of cereals, pulses, green leafy vegetable, roots and tubers, other vegetable, condiments and spices, nuts and oilseeds, fruits, milk and milk products, fats and oils, sugar and jaggery in both group of adolescent girls was 249.53 ± 42.98 g and 264.21 ± 36.99 g, 45.21 ± 23.82 g and 52.76 ± 40.53g, 32.52 ± 18.59 g and 28.95 ± 17.29 g, 34.71 ± 21.71 g and 37.55 ± 25.39 g, 50.88 ± 30.55 g and 55.26 ± 29.66 g, 21.49 ± 7.90 g and 24.42 ± 12.19 g,19.16 ±7.16 g and 12.00 ± 0.00 g, 32.52 ± 20.40 g and 23.82 ± 10.36 g, 96.49 ±31.74 ml and 73.68 ± 25.30 ml, 26.71 ± 5.86 g and 15.00 ± 2.85 g, 23.57 ±7.17g and 24.47 ± 4.16g respectively. The consumption of food intake was below the ICMR recommendation. When critically observed statistically significant difference was noted for cereals, nuts and oilseeds, fruits, milk and milk products and fats and oils.

Per cent adequacy of food intake by adolescent girls as per food habits

The per cent adequacy of food intake as influenced by food habit is given in Table 4. The adequacy of food intake ranged from 17.35 to 94.30 per cent for vegetarian girls and 14.74-97.90 per cent for non vegetarians. In both group highest adequacy was recorded for sugar and jaggery (94.30-97.90 %) followed by cereals (75.62-80.06 %) and least adequacy recorded for roots and tubers (17.35-18.78 %) followed by milk and milk products (14.74-19.30 %), other vegetables (25.44-27.63 %). However per cent adequacy for pulses, green leafy vegetables, fruits found to be (60.29-70.35%),(28.95-60.29%), (23.82-32.52%) respectively.

Nutrient intake of adolescent girls as per food habits

Nutrient intake of adolescent girls as per food habit is depicted in Table 5. According to data maximum intake value recorded for protein 49.26 g, fat 43.86 g, iron 19.91mg, calcium 389.35mg, β-carotene 1878.81 µg, riboflavin 0.80 mg, niacin 13.05 mg among vegetarian girls however on the other side intake of recorded value for energy 1759.68 kcal, thiamine 0.90 mg, folic acid 178.04 mg, vitamin C 61.35 mg and zinc 8.86 respectively was seen among non-vegetarian girls intake. When compared with RDA it was noticed that among vegetarian girls except fat and folic acid remaining were below the RDA. Whereas in non vegetarian girls except fat, folic acid and vitamin C remaining nutrients were below the RDA. Statistically significant difference was observed for niacin at

per cent level while energy, β-carotene, riboflavin, vitamin C and zinc were highly significant at 1 per cent level. However non- significant difference was noted for other nutrients.

Per cent adequacy of nutrient intake of adolescent girls as per food habit

Per cent adequacy of different nutrients as per food habits of adolescent girls is depicted in Table 6. The Table revealed that vegetarian adolescent girls recorded more per cent adequacy for protein (94.54 %), fat (125.31 %), iron (76.59 %), calcium (49.79 %), β-carotene (39.14 %), riboflavin (66.59 %), niacin (93.23 %) whereas intake for energy (72.12 %), thiamine (90.18 %), folic acid (118.69 %), vitamin C (153.82%) and zinc (73.81 %) was high among non-vegetarian girls. High per cent adequacy was observed for fat (116.34 and 125.31%) followed folic acid (114.71and 118.6 %) and niacin (90.53 and 153.82 %) whereas lowest per cent adequacy noted for β-carotene (2.02-39.14 %) and calcium (40.40-49.79 %). Per cent adequacy for other nutrient intake was more than 59 per cent among the adolescent girls belonging to both groups.

Discussion:

When consider the influence of food habit on anthropometric measurement of adolescent girls no specific effect was noted in urban and rural girls with respect to height and weight. Significant difference was observed only for MUAC of urban girls. As increased in height is a genetic factor which is influence by the nutritional status. In the present study urban and rural adolescent girls did not exhibits any statistical significant with respect to height which revealed that growth potential in both the category was same. The difference in the height could be due to variation in consumption of food and many other reasons. Weight directly reflects the level of food consumption and are important factor contributing to the attainment of potential of growth in terms of height. Therefore change in height in the both group between vegetarian and non vegetarian could be justifiable with non-signifi cant difference. Because of rare consumption of animal food by non vegetarian probably contributing for nutritional status difference among the groups for anthropometric measurements.

More percentage of vegetarian girls was normal and overweight also while non vegetarian girls were suffered from one or more degree of under nutrition. The studies conducted in Maharashtra state by Mane *etal* (2012), Jawarkar *etal* (2015) 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. 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.

Mean food intake of cereals, pulses, roots and tubers, other vegetables, condiment and spices, sugar and jaggery were found to be more among non-vegetarian adolescent contrary intake of green leafy vegetable, nuts and oilseed, fruits, milk and milk products, fats and oils was recorded more among vegetarian girls. The similar trend was noted for percent adequacy of food intake for both food habits.

When critically observed between food habits significant difference was noted for intake of energy, β-carotene, riboflavin, niacin, vitamin C and zinc. However nutrient intake were found to be lower than Recommended Dietary Allowances except for fat, folic acid and vitamin C. Consumption of non vegetarian food was rare hence between vegetarian and non vegetarian group non-significant difference was noted for almost many nutrients except B-complex vitamins. High per cent adequacy was observed for fat followed folic acid and niacin whereas lowest per cent adequacy noted for β-carotene and calcium Per cent adequacy for other nutrient intake was more than 59 per cent among the adolescent girls belonging to both groups. As regular diet is cereal based. The common consumed staple food were rich in carbohydrate and cooking pattern improves fat and oilseed intake. Kaur and Kaur (2011) noted in their study carried on rural adolescent girls and boys 16-18 years from Fatehgarh sahib, Punjab that intake of meat products ranges 0.6- 5 g which was very low. Zanver *etal* (2007) carried out study in Marathwada zone of Maharashtra state also reported the consumption of egg, meat or fish were rare. However these findings were in line with our finding.

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Table 1: Anthropometric measurements of selected urban and rural adolescent girls as per different food habits (n=600)

Anthropometric Measurements	Urban			Rural		
	Vegetarian	Non- vegetarian	't' value	Vegetarian	Non- vegetarian	't' value
Height (cm)	154.98 ± 5.76	154.71 ± 7.33	0.19 NS	152.35 ± 5.12	152.60 ± 4.55	1.44 NS
Weight (Kg)	45.85 ± 7.03	47.32 ± 9.02	0.83 NS	44.73 ± 5.05	46.40 ± 4.33	1.40 NS
MUAC (cm)	19.25 ± 2.91	18.28 ± 1.90	2.42*	19.69 ± 1.86	17.35 ± 2.63	0.84 NS
BMI Kg/m²	23.14 ± 2.64	23.87 ± 3.29	1.14 NS	22.40 ± 1.82	22.75 ± 1.25	0.41 NS
Hip cir. (cm)	78.25 ± 11.31	79.66 ± 9.73	0.71 NS	78.68 ± 7.18	83.65 ± 3.93	1.54 NS
Waist cir. (cm)	72.27 ± 11.96	76.68 ± 19.98	1.14 NS	62.84 ± 6.66	63.95 ± 3.59	1.20 NS
Hip /waist ratio	0.91 ± 0.21	0.95 ± 0.3	0.70 NS	0.80 ± 0.12	0.77 ± 0.06	0.02 NS

*- Significant at 5 per cent level NS- Non Significant

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Table 2: Prevalence of under nutrition among selected urban and rural adolescent as per food habit (n=600)

Different grades of under Nutrition	Urban		Rural	
	Vegetarian	Non- vegetarian	Vegetarian	Non- vegetarian
Severe	28 (10.29)	3 (10.71)	10 (3.44)	0 (0.00)
Moderate	39 (14.33)	3 (10.71)	27 (9.31)	0 (0.00)
Mild	60 (22.05)	6 (21.42)	63 (21.72)	0 (0.00)
Normal	137 (50.36)	14 (50.00)	185 (63.79)	10 (100.00)
Obese	8 (2.94)	2 (7.14)	5 (1.72)	0 (0.00)
Total	272	28	290	10

Figures in parenthesis indicate percentage.

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

Particular	Vegetarian	Non- Vegetarian	Balance diet	't' value
Cereals (g)	249.53 ±42.98	264.21±36.99	330	2.34**
Pulses (g)	45.21±23.82	52.76± 40.53	75	1.13NS
Green leafy Vegetable(g)	32.52±18.59	28.95 ±17.29	100	1.23NS
Roots & Tubers (g)	34.71±21.71	37.55±25.39	200	0.67NS
Other vegetables (g)	50.88±30.55	55.26 ±29.66	200	0.87NS
Condiments and spices (g)	21.49±7.90	24.42±12.19	---	1.46NS
Nuts and oilseeds (g)	19.16±7.16	12.00± 0.00	----	23.56**
Fruits (g)	32.52±20.40	23.82±10.36	100	4.16**
Milk and milk Products (ml)	96.49 ±31.74	73.68±25.30	500	5.28**
Fats & oil (g)	26.71±5.86	15.00±2.85	35	22.34**
Sugar & jaggery (g)	23.57 ±7.17	24.47±4.16	25	1.22NS

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

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

Particular	Vegetarian	Non-vegetarian
Cereals (g)	75.62	80.06
Pulses (g)	60.29	70.35
Green leafy Vegetable (g)	32.52	28.95
Roots & Tubers (g)	17.35	18.78
Other veg. (gm)	25.44	27.63
Fruits (g)	32.52	23.82
Milk and milk products (ml)	19.30	14.74
Fats & oil (g)	76.32	42.86
Sugar & jaggery (g)	94.30	97.90

Table 5 : Mean nutrient intake of adolescent girls as per food habits (n=600)

Particular	Vegetarian	Non-vegetarian	RDA	't' value
Energy (Kcal)	1653.91 ± 285.20	1759.68 ± 195.63	2440	**3.11****
Protein (g)	49.26 ±8.94	47.09 ± 6.79	52.1	**1.86**^{NS}
Fat (g)	43.86 ± 27.00	40.72 ± 10.19	35	**1.56**^{NS}
Iron (mg)	19.91± 5.36	19.38 ± 3.76	26	**0.82**^{NS}
Calcium (mg)	398.35±171.30	323.20 ± 248.08	800	**1.84**^{NS}
β-carotene (µg)	1878.81± 2851.98	96.93 ± 218.99	4800	**14.20****
Thiamine(mg)	0.76 ± 0.50	0.90 ± 0.49	1.0	**1.71**^{NS}
Riboflavin(mg)	0.80 ± 0.70	0.70 ± 0.14	1.2	**2.67****
Folic acid (mg)	172.06 ± 70.12	178.04±48.23	150	**0.71**^{NS}
Niacin (mg)	13.05 ± 8.43	11.68± 2.70	14	**2.44***
Vitamin C (mg)	36.21 ± 16.33	61.53 ± 31.99	40	**4.84****
Zinc (mg)	6.77±4.07	8.86± 1.22	12	**7.99****

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 food habit (n=600)

Particular	Vegetarian	Non- vegetarian
Energy (Kcal)	67.78	72.12
Protein (g)	94.54	90.39
Fat (g)	125.31	116.34
Iron (mg)	76.59	74.54
Calcium (mg)	49.79	40.40
β-carotene (µg)	39.14	2.02
Thiamine(mg)	76.09	90.18
Riboflavin(mg)	66.59	58.56
Folic acid (mg)	114.71	118.69
Niacin (mg)	93.23	83.43
Vitamin C (mg)	90.53	153.82
Zinc (mg)	56.39	73.81

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RESEARCH ARTICLE

A CROSS SECTIONAL STUDY ON ANTHROPOMETRIC VARIABLES ON GROWTH & NUTRITIONAL STATUS OF ADOLESCENT GIRLS

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ABSTRACT

Present cross sectional study was carried out to assess anthropometric variables on growth & nutritional status of adolescent girls among 600 adolescent girls of 16-18years from Parbhani district, Maharashtra. The anthropometric status of selected adolescent girls was determined by recording height (cm), weight (kg), mid upper arm circumference (cm), waist circumference (cm), hip circumference (cm) and hip: waist ratio. Body Mass Index was calculated using value of height and weight. On the basis of BMI, adolescent girls were categorized into different grades of under nutrition. Daily food intake of each selected adolescent girls was recorded with the help of three day recall method and weightment method. Nutrient intake was calculated by using Nutritive value of Indian food book. Percent adequacy of food intake was calculated using balance diet table for adolescent girls and percent adequacy of nutrient intake was done by using RDA table. The finding of study showed that Recorded values for anthropometric measurements revealed that urban girl's exhibits better values for height and weight while rural girls noted highest value for body mass index. Adolescent girls were categorized in to different grade of under nutrition on the basis of BMI. As per area, age, food habit and family income level showed that 5.00 to 71.62 per cent of girls were normal while remaining were suffering with one or other degree of under nutrition. Mean per cent adequacy for cereal ranged from 67.64 to 84.21 per cent. The per cent adequacy for pulses intake was ranged from 49.67 to 70.35 per cent. The range of per cent adequacy for green leafy vegetable, roots & tubers and other vegetables was 28.95 to 34.68, 16.13 to 20.01 and 18.14 to 33.1 per cent respectively. Per cent adequacy for fruit intake was ranged from 23.82 to 36.3. Per cent adequacy for Milk and milk products intake was ranged from 16.7 to 23.45. Per cent adequacy for fats and oil ranged from 42.86 to 80.12 per cent. Whereas per cent adequacy of calorie intake was ranged from 65.17 to 72.12 per cent. Per cent adequacy of protein and fat intake was ranged from 90.24 to 98.32 and 112.19 to 132.77 per cent. Per cent adequacy of iron, calcium and zinc intake ranged from 72.47 to 89.21, 40.4 to 62.77 and 53.76 to 73.81 per cent respectively. Per cent adequacy of β-carotene intake ranged from 2.02 to 98.45 per cent. Per cent adequacy of thiamine, riboflavin and niacin were ranged from 50.55 to 90.18, 56.47 to 94.68 and 83.43 respectively. Per cent adequacy of folic acid intake ranged from 102.89 to 122.85 per cent whereas vitamin C consumption ranged from 73.31 to 153.82 per cent.

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INTRODUCTION

Adolescence is a particularly unique period in life because it is a time of intense physical, psychosocial, and cognitive development. Increased nutritional needs at this juncture relate to the fact that adolescents gain up to 50% of their adult weight, more than 20% of their adult height, and 50% of their adult skeletal mass during this period. Caloric and protein requirements are maximal. Increased physical activity, combined with poor eating habits and other considerations, e.g. menstruation and pregnancy, contribute to accentuating the potential risk for adolescents of poor nutrition. Anthropometrics can be sensitive indicators of health, growth and development in infants and children. In particular anthropometry has been used during adolescence in many contexts related to nutritional status. According to World Health Organization, the ultimate intention of nutritional assessment is to improve human health. Malnutrition which refers to an impairment of health from a deficiency or imbalance of nutrients is of public health significance among adolescents all over the world. It creates lasting effect on the growth, development and physical fitness of a person. It is well recognized worldwide that anthropometric measurements are indispensable in diagnosing under nutrition.

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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 behaviors that are common among adolescents. Busy schedules may lead to meal skipping, snacking throughout the day and more eating away from home. Peer pressure is very high during adolescence. The need to be in the step with trends and belong to the peer group leads to adolescent eating non-nutritious foods like pizzas, burgers coffees, soft drinks, chocolates and also other roadside junk foods. Awareness about one's body and its appearance becomes the top priority. Dietary nutrients are consumed by the body to provide energy and structural material needed for regulating growth, maintenance and repair of the tissue. The intake of all the essential nutrients in the form of a balanced diet brings health benefits for the present and also for the future. Energy is required for growth and activity. Insufficient food will not only result in under nutrition in terms of inadequate weight gain but will also hinder growth. The rate of growth fluctuates from one age to another. In view of this present cross sectional study was carried out on anthropometric variables on growth & nutritional status of 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 district. Availability of adolescent girls was ascertained through visit to college, hostel and home. The anthropometric status of selected adolescent girls was determined by recording height (cm), weight (kg), mid upper arm circumference (cm), waist circumference (cm), hip circumference (cm) and hip: waist ratio. BMI was calculated using value of height and weight. On the basis of BMI, adolescent girls were categorized into different grades of under nutrition. Daily food intake of each selected adolescent girls was recorded with the help of three day recall method and weightment method. Nutrient intake was calculated by using Nutritive value of Indian food book. Percent adequacy of food intake was calculated using balance diet table for adolescent girls and percent adequacy of nutrient intake was done by using RDA table.

RESULTS

The anthropometric measurements of adolescent girls from different socio economic categories: The anthropometric measurements of adolescent girls from different socio economic categories are described in the Table1. The height of girls ranged from 152.08 ± 5.66 to 155.09 ± 5.78cm. Adolescent girls aged 18 years noted highest value for height (155.09 ± 5.78 cm) while the least value was noted 16 years (152.08 ± 5.66 cm).Area wise distribution showed that urban adolescent girls were having better height (154.96 ± 5.91 cm) than rural (152.34 ±5.02 cm). Similarly the adolescent girl belonging to non-vegetarian and high income group girls had better height than their counter parts. The weight of girls was ranged from 44.26 ± 5.784 to 46.10 ± 6.84 kg. However value for weight was noted highest for high income group (46.10 ± 6.84 kg) and least values were noted for non vegetarian girls (44.26 ±5.84 kg). Similarly urban adolescent girls, 17 years age and vegetarian girls had better weight than their counter parts. The range of body mass index was 15. 23 ± 0.72 to 19.65± 2.74 kg/m^2.Middle income group showed highest value (19.65 ± 2.74 kg/m^2) whereas non vegetarian girls showed least values (15. 23 ± 0.72 kg/m^2) for body mass index. MUAC ranged from 22.35 ± 2.21 to 23.21 ± 2.71 cm. Urban girls noted highest value (23.21 ± 2.71 cm) while adolescent girls having age 16 years noted least values (22.35 ± 2.21 cm) for MUAC. Hip circumference ranged from 72.56 ± 15.85 to 79.76 ± 8.64 cm. It was noted that rural adolescent girls showed highest value (79.76 ± 8.64 cm) where as non-vegetarian showed least values (72.56 ± 15.85 cm) for Hip circumference. Waist circumference ranged from 62.96 ± 6.51 to 72.69 ± 12.94 cm. Urban adolescent noted highest value (72.69 ± 12.94cm)and rural adolescent noted least values (62.96 ± 6.51 cm) for Waist circumference. In case of Hip: Waist ratio it was noted that values ranged from 0.80 ± 0.80 to 0.92 ± 0.25cm and urban girls noted highest value (0.92 ± 0.25 cm) whereas rural adolescent noted least values (0.80 ± 0.80 cm) for Hip: Waist ratio respectively.

Prevalence of under nutrition among selected adolescent girls: Prevalence of under nutrition among selected adolescent girls based upon body mass index is presented in Table 2. When compared area wise almost equal per cent of adolescent were suffering with mild and moderate grade of under nutrition which was comparatively more than rural girls. However 35.63 per cent adolescent from 18 years of age group reported mild grade of under nutrition followed by 16 years of girls (23.11 %) further it was also reported that non vegetarian girls were categorized as either mild, moderate or severe grade of under nutrition. In the same way it was also noted from the table that maximum girls from high income reported mild grade under nutrition.

Mean per cent adequacy of food intake of selected adolescent girls from different socio economic categories: Mean per cent adequacy of food intake of selected adolescent girls from different socio economic categories is presented in Table 3. Mean per cent adequacy of intake of cereal ranged from 67.64 to 84.21 per cent. However urban adolescent girls recorded highest per cent adequacy of intake of cereals (84.21%) while lowest per cent adequacy of intake was noted by rural adolescent girls (67.64 %). Similarly the adolescent girl belonging to 17 yrs of age group, non-vegetarian and middle income group girls recorded highest per cent adequacy of intake of cereals than their counter parts. The per cent adequacy of pulses intake was ranged from 49.67 to 70.35 per cent. However highest per cent adequacy for pulses intake was noted for non- vegetarian girls (70.35 %) and least per cent adequacy was equally contributed by girls belonging to urban and rural area (49.67 %). Similarly 17 years old adolescent girls and high income girls had better per cent adequacy for pulses than their counter parts. The range of per cent adequacy of consumption of green leafy vegetable was 28.95 to 34.68 per cent. Girls belonging to middle income group showed highest per cent adequacy for consumption of green leafy vegetable (34.68 %) whereas non vegetarian girls showed least per cent adequacy (28.95 %). Per cent adequacy of roots and tubers intake was ranged from 16.13 to 20.01 per cent. Adolescent girls of 18 years noted highest per cent adequacy (20.01 %) while adolescent girls of 17 years noted least per

Table 1. Anthropometric measurements of selected adolescent girls from different socio economic categories (n=600)

Particular	Height (cm)	Weight (Kg)	BMI (Kg/m^2)	MUAC (cm)	Hip circumference(cm)	Waist Circumference (cm)	Hip /waist ratio
Area							
Urban	154.96 ± 5.91	45.99 ± 7.23	19.16 ± 2.84	23.21 ± 2.71	78.39 ± 11.16	72.69 ± 12.94	0.92 ±0.22
Rural	152.34 ±5.02	44.97 ±5.06	19.39 ±2.06	22.43 ±1.79	79.12 ±7.15	62.96 ±6.51	0.80 ±0.12
Age							
16 yrs	152.08 ± 5.66	44.96 ± 5.99	19.31 ± 2.09	22.35 ± 2.21	78.73 ± 9.02	64.01 ± 9.46	0.82 ± 0.16
17 yrs	154.34 ± 5.33	45.79 ± 6.36	19.40 ± 2.74	23.02 ± 2.24	79.07 ± 9.63	68.78 ± 11.46	0.88 ± 0.20
18 yrs	155.09 ± 5.78	45.69 ± 6.53	18.75 ± 2.39	23.25 ± 2.72	77.74 ± 9.35	73.78 ± 11.90	0.88 ± 0.16
Food habits							
Vegetarian	153.55 ± 5.64	45.56 ± 6.28	19.55 ±2.31	22.79 ±2.35	79.17 ± 8.63	67.71 ± 11.16	0.84 ± 0.17
Non- vegetarian	155.13 ± 5.34	44.26 ± 5.84	15.23 ± 0.72	23.17 ± 1.97	72.56 ± 15.85	69.38 ±13.70	1.08 ± 0.30
Family income							
Rs.<10000	152.77 ± 5.51	44.80 ± 5.71	19.09 ± 2.43	22.60 ± 2.20	78.12 ± 9.57	65.94 ± 9.68	0.85 ± 0.18
Rs.10001-20000	154.43 ± 5.57	46.10 ± 6.84	19.65 ± 2.74	23.00 ± 2.25	79.76 ± 8.64	68.65 ± 12.08	0.88 ± 0.20
Rs.>20001	154.31 ± 5.75	45.97 ± 6.36	19.10 ± 2.13	23.01 ± 2.64	78.61 ± 9.92	70.46 ± 12.69	0.84 ± 0.18

Table 2. Prevalence of under nutrition among selected adolescent girls (n=600)

Particular	Grade of under nutrition					Total
	Severe	Moderate	Mild	Normal	Over weight	
Area						
Urban	30 (5.00)	43 (7.17)	43 (7.17)	174 (29.00)	10 (1.67)	300
Rural	11 (1.83)	24 (4.00)	26 (4.33)	234 (39.00)	5 (0.83)	300
Age						
16 years	8 (3.77)	20 (9.43)	49 (23.11)	130 (61.32)	5 (2.36)	212
17 years	32 (10.63)	32 (10.63)	49 (16.28)	181 (60.13)	7 (2.33)	301
18 years	2 (0.66)	14 (16.09)	31 (35.63)	37 (45.23)	3 (3.45)	87
Food habits						
Vegetarian	36 (6.41)	59 (9.83)	63 (11.21)	389 (69.22)	15 (2.67)	562
Non- vegetarian	6 (15.79)	7 (18.42)	7 (18.42)	18 (47.37)	0 (0.00)	38
Family income						
Rs.<10000	24 (8.79)	32 (11.72)	30 (10.99)	181 (66.30)	6 (3.11)	273
Rs.10001-20000	12 (6.22)	21 (10.88)	20 (10.36)	133 (68.91)	7 (3.63)	193
Rs.>20001	6 (4.48)	13 (9.70)	20 (14.93)	93 (69.40)	2 (1.49)	134

Figures in parenthesis indicate percentage.

Table 3. Mean per cent adequacy of food intake of selected adolescent girls from different socio economic categories (n=600)

Particular	Cereals (g)	Pulses (g)	Green leafy Vegetable (g)	Roots & Tubers (g)	Other veg. (g)	Fruits (g)	Milk and milk products (ml)	Fats & oil (g)	Sugar & jaggery (g)
Area									
Urban	84.21	49.67	32.7	18.5	33.1	32.5	16.7	70	93.5
Rural	67.64	49.67	31.87	16.35	18.14	31.44	21.31	78.43	95.47
Age									
16 years	72.41	57.92	30.45	17.94	21.29	27.12	16.9	65.5	89.25
17 years	78.9	64.9	32.25	16.13	28.99	36.3	19.23	78.86	99.26
18 years	78.66	58.55	33.53	20.01	27.39	33.04	23.45	80.12	92.39
Food habits									
Vegetarian	75.62	60.29	32.52	17.35	25.44	32.52	19.3	76.32	94.3
Non- vegetarian	80.06	70.35	28.95	18.78	27.63	23.82	14.74	42.86	97.9
Family income									
Rs.<10000	74.92	59.05	31.96	16.29	23.19	31.08	16.82	68.45	91.72
Rs.10001-20000	77.47	59.63	34.68	18.77	26.9	27.9	19.79	79.71	102.54
Rs.>20001	76.32	64.31	31.22	18.19	28.06	28.33	21.49	78.61	93.13

cent adequacy (16.13 %) for intake of roots and tubers. Per cent adequacy of consumption of other vegetables ranged from 18.14 to 33.1 per cent. It was noted that urban adolescent girls showed highest value (33.1%) whereas rural adolescent girls showed least values (18.14%). Per cent adequacy of fruit intake was ranged from 23.82 to 36.3 per cent. Further 17 years old girls recorded highest value (36.3%) whereas non vegetarian girls recorded lowest value (23.82%).

Table 4. Mean per cent adequacy of nutrient intake of selected adolescent girls from different socio economic categories (n=600)

Particular	Energy (Kcal)	Protein (g)	Fat (g)	Iron (mg)	Calcium (mg)	β-carotene (µg)	Thiamine (mg)	Riboflavin (mg)	Folic acid (mg)	Niacin (mg)	Vitamin C (mg)	Zinc (mg)
Area												
Urban	69.71	98.32	112.19	77.64	44.04	21.35	89.52	59.97	116.8	92.34	97.78	61.22
Rural	66.4	90.24	137.29	75.29	54.36	52.24	64.45	72.18	117.41	92.89	91.3	53.76
Age												
16 years	67.32	94.14	128.87	75.22	46.79	18.33	79.45	56.47	102.89	95.35	109.21	61.48
17 years	69.49	94.73	119.29	73.39	46.7	30.85	83.23	64.07	121.15	87.89	76.41	55.24
18 years	65.17	93.16	132.77	89.21	62.77	98.45	51.21	94.68	122.85	101.5	119.04	55.54
Food habits												
Vegetarian	67.78	94.54	125.31	76.59	49.79	39.14	76.09	66.59	114.71	93.23	99.53	56.39
Non vegetarian	72.12	90.39	116.34	74.54	40.4	2.02	90.18	58.56	118.69	83.43	153.82	73.81
Family income												
Rs.<10000	68.88	94.3	128.38	76.14	44.8	20.8	86.57	59.01	112.52	93.27	101.83	60.88
Rs.10001-20000	68.31	93.88	120.56	72.47	46.77	34.6	81.78	66.64	121.87	89.37	73.31	54.76
Rs.>20001	66.02	94.81	123.34	82.88	61.66	72.51	50.55	79.65	109.98	95.94	110.27	54.51

Per cent adequacy of Milk and milk products intake was ranged from 16.7 to 23.45 per cent. Highest per cent adequacy for milk and milk products was noted among adolescent girl of 18 year (23.45 %) and lowest per cent adequacy was noted by urban girls (16.7 %). Per cent adequacy of intake of fats and oil ranged from 42.86 to 80.12 per cent. However adolescent girls of 17 years recorded highest per cent adequacy (80.12 %) and 16 years adolescent recorded lowest per cent adequacy (42.86 %). In case of per cent adequacy of sugar & jaggery intake values were ranged from 89.25 to 102.54 per cent and girls belonging middle income group noted highest per cent adequacy (102.54 %) whereas adolescent of 16 years noted least per cent adequacy (89.25 %). In the nut shell it can be concluded from the table that highest per cent adequacy for roots & tubers, milk & milk products and fats & oil were recorded by 18 years adolescent girls, however per cent adequacy mentioned by 17 years adolescents girl for pulses and fruits, whereas per cent adequacy for cereals and other vegetables were recorded by urban girls, further per cent adequacy for sugar & jaggery and green leafy vegetable by girls belonging to middle income group.

Mean per cent adequacy of nutrient intake of selected adolescent girls from different socio economic categories

Per cent adequacy of nutrient intake among selected adolescent girls from different socio economic categories is presented in Table 31 and Fig.6a, 6b. Mean per cent adequacy of calorie intake was ranged from 65.17 to 72.12 per cent. Non vegetarian girls recorded highest per cent adequacy for calorie (72.12 %) while lowest per cent adequacy was noted by adolescent girls of 18 years (65.17 %). Per cent adequacy of protein intake was ranged from 90.24 to 98.32 per cent. Highest per cent adequacy was noted for girls belonging to urban (98.32 %) and least per cent adequacy was noted by rural girls (90.24 %). Similarly 17 years old adolescent girls and high income girls had better per cent adequacy for protein than their counter parts. The range of per cent adequacy of fat intake was 112.19 to 132.77 per cent. The highest per cent adequacy was recorded by adolescent girls of 18 year (132.77 %) whereas urban girls showed least per cent adequacy (112.19 %) for fat. Per cent adequacy of Iron intake ranged from 72.47 to 89.21 per cent. Adolescent girls of 18 years noted highest per cent adequacy (89.21%) while middle income group noted least per cent adequacy (72.47%) for intake of iron. Per cent adequacy of Calcium consumption ranged from 40.4 to 62.77 per cent. It was noted that adolescent girls belonging to 18 years showed highest per cent adequacy (62.77 %) whereas non vegetarian showed least per cent adequacy (40.4%) for calcium. Further per cent adequacy of β-carotene intake ranged from 2.02 to 98.45 per cent. Highest per cent adequacy was recorded by 18 yrs of girls (98.45%) and low income group noted least values (2.02 %). Per cent adequacy of Thiamine intake was ranged from 50.55 to 90.18 per cent and non vegetarian recorded highest per cent adequacy (90.18%) and adolescent girls of 18 yrs and high income group recorded lowest per cent adequacy (50.55%). Per cent adequacy of Riboflavin intake was ranged from 56.47 to 94.68 per cent. Highest per cent adequacy recorded by girls of 18 yrs (94.68 %) whereas lowest per cent adequacy was recorded by 16 yrs old girls (56.47%). Per cent adequacy of Folic acid intake ranged from102.89 to 122.85 per cent. Highest per cent adequacy for folic acid was noted among adolescent girl of 18 year (122.85 %) and lowest was noted by adolescent girl of 16 year (102.89 %). Per cent adequacy of Niacin was ranged from 83.43 ± 101.5 per cent. Adolescent girls of 18 years recorded highest per cent adequacy (101.5%) and non vegetarian girls recorded lowest value (83.43 %). Per cent adequacy of vitamin C consumption ranged from 73.31 to 153.82 per cent. Non vegetarian girls recorded highest per cent adequacy for vitamin C consumption (153.82 %) and least per cent adequacy was recorded by girls belonging to middle income group (73.31%). In case of per cent adequacy of zinc intake non vegetarian girls noted highest per cent adequacy (73.81%) whereas rural girls noted least per cent adequacy (53.76%) and intake of zinc ranged from 53.76 to 73.81 per cent. In the nutshell it can be concluded from the above table that 18 yrs girls recorded highest value for intake of fat, iron, calcium, β-carotene, riboflavin, folic acid, niacin and non vegetarian girls also recorded highest value for thiamine, vitamin C and zinc contrary lowest per cent adequacy for energy by 18 yrs, protein and zinc by rural girls, riboflavin and folic acid by 16 yrs, calcium, β-carotene and niacin by non vegetarian girls and iron by girls belonging to middle income group.

DISCUSSION

The present data on anthropometric measurements of adolescent girls (Table.3) revealed that the girls from urban area were better off in their height, weight, mid upper arm circumference and waist circumference as compared to the rural adolescent girls. It also revealed from the table that as age increase height, weight, mid upper arm circumference and waist circumference increases. The result reported by Zanver *et al.* (2007) were also in line with the present results they reported that urban adolescent girls were having better height,

ght and body mass index than rural and tribal adolescent s. Lata *et al* (2012) who conducted studies in Karad, Satara rict of Maharashtra were also reported the same result. The ect of food habit showed that vegetarian girls recorded d height, mid upper arm circumference and waist cumference. Majority of studied adolescent girls belong to come group Rs.10, 001 – 20,000 shows better value for all hropometric measurements. Borkar and Khan (2017) dertaken the study in Parbhani, Maharashtra also reported same result which are going in hand in hand with present ding. An increase in income status always enhance rchasing power of family resulting in better food nsumption which directly affect on the growth of children ecially adolescent girls. Therefore it is assumed that socio conomic environment of the family also influence on the owth and development of adolescent girls. Influence of socio conomic factors on prevalence of under nutrition revealed in Table (2). Persual of tables revealed that maximum percent of ormal girls were present in rural area while high percent of rban girls were suffered with one or more grade of under rition and over nutrition. When observed age wise high rcent of normal girls from 16 years on the contrary majority f 18 years adolescent girls categorized under the grade of ild, moderate and overweight, while 17 years girls were ffering with severe under nutrition. More percentage of egetarian girls was normal and overweight also while non egetarian girls were suffered from one or more degree of under nutrition. Further it was noted that irrespective of family income, almost 66.3 to 69.4 percent girls were normal. The studies conducted in Maharashtra state by Mane *et al.* (2012), Jawarkar *et al.* (2015) 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.

When seen critically it was crystal clear from the result that the per cent adequacy of cereal, pulses, sugar and jaggery was found to be maximum followed by fats and oil seeds. Daily diet in Maharashtra included Jowar, Wheat, Rice, Poha or Rawa. 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 tobe high as tea, milk and coffee intake was very frequent i.e. twice and thrice a day. Per cent adequacy of nutrient intake of selected adolescent girls is reported in Table (4). It is revealed from the table that irrespective all socio economic parameters per cent adequacy was found to be more than 100 per cent for fat (112.19- 137.29 %), vitamin C (153.82 %) folic acid (102.89- 122.85 %) and niacin (101.50 %). However 90-100 per cent adequacy was recorded for protein (90.24-98.32 %), β- carotene (98.45 %), riboflavin (94.68 %), thiamin (90.18 %), and iron (89.21 %). Further it is reported that 60 to 70 per cent adequacy was recorded for energy (66.02- 72.12 %), calcium (62.77 %) and zinc (61.22 %). As the present study was conducted in Marathwada zone. In almost all families groundnut powder is the main ingredients for preparation of all types of gravies prepared for curries. Apart from this chutnies of groundnut, seasamum, niger seed coconut and linseed were commonly prefer in any meal along with curries and koshimbir. Practice of applying oil at the time of roasting chapatti and use of extra oil for spicy curries and dal. These might be reason for highest per cent adequacy of fat. Also the per cent 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 was also found to be common among studied area. Lemon juice with sugar and lime in black tea was also very common pattern forms very good per cent adequacy for vitamin C. Consumption of leafy vegetable also enhances the vitamin C intake.

Conclusion

Nutritional status is a reflection of adequate intake of food and nutrition hence it is recommended for create awareness about importance of balance diet among adolescent girls and their mother.

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A Study on Awareness about COVID 19 among Adolescent Girls

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ABSTRACT

Present study was carried out to assess an awareness about COVID -19 among adolescent girls from 11 and 12 standards (15 - 16 years) residing in Pusad taluka of Yavatmal district, Maharashtra State. Awareness about COVID-19 was assessed using a Pre tested questionnaire through a personal interview method. Data was collected, tabulated and frequency calculated. the findings of study showed that 70 percent of adolescent girls were aware about following three preventive measures to protect from COVID 19, also take proper care i.e., wash hand and legs immediately, cloth were washed and use sanitizer after coming outside to home whereas 70 percent of adolescent girls were aware about following three preventive measures to protect from COVID 19, also take proper care i.e., wash hand and legs immediately, cloth are washed and use sanitizer after coming outside to home. It was observed that 62 percent of adolescent girls used sanitizer. Among the respondents, 83.1% and 74.9% indicated they prefer frequent hand washing with soap and water and use alcohol-based sanitizer, respectively and only 31 percent adolescent girls were knowing exactly time sanitizer used to clean hand. Majority of girls were unaware about nutritional care i.e. need to be change in dietary pattern or food intake for improving immunity power and necessity of maintaining sound health.

Keywords: Adolescent girls, COVID-19, awareness, nutritional care, preventive measurements.

I. INTRODUCTION

Global health experts and South Asian governments have expressed concern about the spread of COVID- 19 and potential for more than 7.6 million deaths in South Asia if no action were taken (Walker et al, 2020). India reported its first COVID-19 case on January 30, 2020 and numbers began to rise in late March 2020, (Johns Hopkins Corona virus Resource Center, 2020) albeit at a low rate, which may be attributed to several government policies including stopping all international flights and implementing a nation-wide lockdown at an early stage of the pandemic. By early April 2020, country officials had identified several areas as hotspots of COVID-19 infections in the country. India faces threat of a serious outbreak due to deep challenges in practicing social distancing and access to water and soap for hand washing (Austrian etal 2020).

Adequate nutrition is required for all cells, including those of the immune system, to function at their best (Childs etal 2019). An "activated" immune system additionally enhances energy demands during the SARS-CoV-2 infection, with an increased basal metabolic rate. Therefore, optimized nutrition for the best immune outcomes would be one that supports immune cell function by allowing them to engage robust responses to pathogens, but also to improve the responsiveness when appropriate, avoiding any underlying chronic inflammation. Cena etal (2020) suggest that to improve the efficiency of the immune system, it would be advisable to include specific foods in the diet as good sources of antioxidants,such as fresh fruit and vegetables, soy, nuts (Yahfoufi etal 2018), and omega-3 fatty acids all being low in saturated fats and trans fats (Seidelmann etal 2018). These nutrients helps to improve immunity power during Corona Pandemic.

It is essential to take personnel care and preventive measure during Corona Pandemic because the Corona is transmitted disease whereas nutritional care is necessary i.e. change in dietary pattern to food intake for improving immunity power to maintain sound health. On this background present study is carried out during the IInd phse of Corona Pandemic to assess an awareness about COVID-19 among adolescent girls about personnel care, preventive measure and nutritional care.

II. METHODOLOGY

Purposively 100 adolescent girls of 15-16 years studying in 11 th and 12 th class were selected from Pusad taluka of Yavatmal District. Collected information on awareness about Coronavirus focusing on personal preventive measures and awareness about personnel care against Corona- 19, collected by personal interview method with a pre-planned questionnaire.

Data was collected, tabulated and percentages were calculated to assess the awareness among adolescent girls towards COVID-19.

III. RESULT AND DISCUSSION

Table1. Awareness about personnel preventive measure against COVID -19

Table 1 showed the information about personnel preventive measure against COVID -19.From the table it was noticed when asked how to protect yourself the responses were as follows 3 percent for maintaining social distance, 13 percent for use of mask, 14 percent for use of sanitizer and 70 percent adolescent girls gave responses for using the above three preventive measures. When asked adolescent girls What to do after coming home from outside, responses were as wash hand and legs (10 %), use of sanitizer (13%), wash wear cloth (7%) and 70 percent use all three preventive measures. When asked about hand cleaning majority responses getting for used sanitizer (62%) followed by soap (18%) and only use water 4 percent whereas 16 percent have no idea about hand cleaning. Response getting for at what exactly time hand should be scrub 31 percent responses getting for 20 seconds followed by 29 percent for 30 seconds, 27 percent for 10 seconds and 13 percent for 15 seconds. When asked about which ideal cloth mask responses getting for triple layer cloth mask 38 percent followed by 21 percent for single layer cloth mask and 15 percent responses for handkerchief whereas 26 percent had no idea respectively. Responses getting for type of mask majority responses for mask should cover nose and mouth (79%) whereas 13 percent and 3 percent responses for mask cover only mouth and cover face while remaining 5 percent have no idea about type of mask.

Table 2: Awareness about nutritional care during COVID -19

Table 2 depicted the information of awareness about nutritional care during COVID- 19.The question asked regarding the changes in diet, maintaining good health and requiring improving immunity power the responses recorded in yes or no. The response recorded for the changes in diet 24 percent of adolescents agree with change in diet while 76 percent were not agreeing with change in diet. Maintaining good health 24 percent adolescent girls were agree whereas 76 percent were not agreed while 29 percent adolescent were agreed for improving immunity and 71 percent were not agree for improving immunity.

IV. DISCUSSION

From table 1 it was observed that 70 percent of adolescent girls were aware about following three preventive measures to protect from covid 19, also take proper care i.e., wash hand and legs immediately, cloth were washed and use sanitizer after coming outside to home. Priya and Sheela (2020) observed that that majority of respondents have good knowledge (52.8%), average knowledge (43.50%) and 3.7% respondents had poor knowledge when conducting a survey among adolescent girls from Pune city.

It was observed that 62 percent of adolescent girls used sanitizer. Desalegn (2021) etal also observed the same during study on the public knowledge, attitude, and practice (KAP) and response of the service providers regarding COVID-19 most of the public had a positive attitude (60.7%) towards implementation of preventive measures against COVID-19.

Among the respondents, 83.1% and 74.9% indicated they prefer frequent hand washing with soap and water and use alcohol-based sanitizer, respectively and only 31 percent adolescent girls knew exactly the time sanitizer was used to clean their hands. In this context. It is necessary to get proper guidance regarding the correct way to clean hands by using sanitizer. In case of mask 38 percent responds for three-layer clothing mask and it was surprised that 79 percent adolescent girls knowing that mask should cover nose and mouth. It was noted that studied adolescent girls were well aware about personnel preventive measure against Corona-19.Where as from table 2, it was noted that majority of girls were unaware about nutritional care i.e. need to be change in dietary pattern or food intake for improving immunity power and also necessary to maintain sound health.

V. CONCLUSION

this survey was carried out during the second wave of corona-19 pandemic so it is urge to give proper education to adolescents to protect from Covid- 19 pandemic because adolescent is next responsible generation of Nation.

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Table1. Awareness about personnel preventive measure against COVID -19 (n=100)

S.No.	Awareness about personnel preventive measure against COVID -19	Percentage (%)
I	**How to protect yourself**	
A	Maintain social distance	3
B	Use of mask	13
C	Use of sanitizer	14
D	All of above	70
II	**What to do after coming home from outside**	
A	Wash hand and legs	10
B	Use sanitizer	13
C	wash clothes	7
D	All of above	70
III	**Hand should be wash using**	
A	only use water	4
B	Using soap	18
C	Using sanitizer	62
D	Using vinegar	16
IV	**At what exactly time sanitizer used to clean hand**	

A	10 seconds	27
B	20 seconds	31
C	15 seconds	13
D	30 seconds	29
V	**Which is ideal mask**	
A	Handkerchief	15
B	Single layer cloth mask	21
C	Tripple layer cloth mask	38
D	No idea	26
VI	**What type of mask used**	
A	Cover nose and mouth	79
B	Cover only mouth	13
C	Cover face	3
D	No idea	5

Table 2: Awareness about nutritional care during COVID -19 (n=100)

S. No.	Awareness about personnel care during COVID -19	Percentage (%)
I	**Change in diet is required**	
a	Yes	24
b	No	76
II	**Maintaining good health is necessary**	
a	Yes	24
b	No	76
III	**Improving immunity is necessary**	
A	Yes	29
B	No	71

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Skill Development A Need for Better Career Opportunity

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ABSTRACT

Education is a process which aims the overall development of individual. In the era moderation of university education is not sufficient besides this importance gained for skill development. Both soft and hard skill were essential to achieve personnel and professional growth.

Keywords: Skills, soft, hard, importance, advantages.

I. INTRODUCTION

Education is a process which aims the overall development of individual with positive changes in the behaviour so that they can turn in effective member of society. Education in its general sense is a form of learning in which the knowledge, skills, and habits of a group of people are transferred from one generation to the next through teaching, training, or research. Education cannot be confined to provide knowledge to children in educational institutions as it goes from birth till death. It includes the effect of everything which influences human personality. India has one of the largest higher education systems in the world, with more than 36,700 Colleges, 825 Universities and Vocational Institutes. India is the third largest country in the world in students, after China and the United States.

Getting a degree from a university requires lots of time and effort from students. A typical 5-year education nominally requires 8000 hours of studying. Research carried out at Harvard and Stanford Universities observed that only 15% of career success is provided by hard skills, whilst other 85% by soft skills. On the background of this observation, it is the fact that university education which is based on Curriculum frame work which gives knowledge but according to era of modernization with digitalization there is some lacuna for developing skill among students. The present review study is carried out with the objective to know the importance and advantages of Skill Development.

II. METHODOLOGY

To carried out present study available secondary data were used.

III. RESULT AND DISCUSSION

Education emphasis on the intellectual development of the student which is result oriented. This format of education prepared the degree holder students but the current demands from our graduate holder students was beyond from their degrees. The changing nature of work environments, the emergence of technology-driven processes required employable graduates to full these demands. Thus, it is necessary to focus on importance of skills which were broadly categorised as Hard and Soft skills.

- Hard skills are technical and easily quantifiable. The knowledge gained through education and work experience.
- Soft skills are interpersonal skills that have more to do with personalityi.e, communication skills, leadership skills, work ethics, professional skills, adaptive skills, etc

Hard and soft skills are inherently different but complement each other. In other words, both skills are distinguishable but cannot compared to each other hence these skills are essential for Personnel as well as Professional development.It is necessary to identify gap between skills. Yorke & Harvey,2002 stated that students should be aware of the needs and relate their abilitiesto be able them to meet the requirement of their future by employers so they can improve their self for betterment of future.It is critical to accept that knowledge does not guarantee skill; only implementing or applying knowledge does.Theoretical knowledge can provide an imaginative framework, but only practical knowledge can provide real-world exposureand enables building a life of choice.

There are many advantages of skill development:

1. Enhances self-awareness – Skill development begins with an assessment of the gap between the current situation and thedesired future situation. This helps in identifying one's strengths and areas of improvement.Often With our hectic schedules, it may be difficult to take the time to reflect on who we are, our strengths and weaknesses, ourmotivations and personalities, our habits and values.Furthermore, many of us aren't inclined to devote much time to self-reflection and skill development enables an increased self -awareness.
2. Leads to career advancement – Spending time honing your skills can help achieve personal career goals like getting apromotion or becoming an expert on a particular subject.

Skill sets can be used to advance in a current career or broadened to qualify for a job in a different field or industry.

3. Gives a leading edge – It is important to constantly develop and find strategies to keep up with the changes if they are tothrive. Skill Development is critical, especially when it comes to keeping up with industry changes, rules, and regulations.
4. Increases productivity and boosts morale – Skill development is critical for increasing confidence and removing self-doubt. When motivation levels are high, efficiency and effectiveness increase, resulting in increased job satisfaction. (https://thechanges.in/).

Skilling India is important for two main reasons:

1. The growth of the service sector in India – The natural economic movement of a country goes from an agrarian economy toan industrial economy to a service economy but India has leapfrogged from an agrarian economy to a service economy. Thisremarkable feature of India's recent growth is diversification

into services, with the services sector dominating GDP increasingthe importance of skill development in job creation.

2. India is a young nation – With more than 62 percent of the population in the working-age group (15-59 years) and more than54 percent of the total population under the age of 25, India is now one of the world's youngest countries. The labour force in thedeveloped world is expected to decline by 4% over the next 20 years, while it will increase by 32% in India.

When discussed about skills it is important to know about characteristics of hard and soft skills which is useful to identify the skill for enhancing skills.

Hard skills:

- Hard skills are learnable.
- Hard skills are generally listed in the job postings or job descriptions.
- Hard skills are closely associated with a specific program of study (major) or career field; so often hard skills are referred to as "Discipline Related" or "Content Specific" skills.
- They are the Technical Skills necessary for success in the workplace. Such as pharmacy skills, biology skills, architecture skills, computer skills, math skills, therapeutic skills, teaching skills, graphic design skills, etc
- Hard skills are often learned in schools and from books.
- They may be easy to observe, quantify, and measure. Typically, there is a direct path as to how one would excel at each hard skill.
- Hard skills are often consistent regardless of which company you work for, what circumstances you may be in, or who you work with.

Soft Skills:

- Soft skills are not closely associated with a specific program of study (major) or career field. They are applicable to all workplaces or careers, and can "transfer" across all disciplines; so often soft skills are referred to as transferable skills.
- They are the Non-Technical Skills necessary for success in the workplace. Such as interpersonal skills, human relations skills, social skills, organizational management skills, time management skills critical thinking skills, problem solving skills, etc. . .
- Soft skills may be referred to as "transferable" skills.
- They are more of your "people" skills. Where rules change depending on the company culture or the people you work with.
- Soft skills are hard to observe, quantify, or measure. They are typically associated with behaviours and personality traits of an individual. (E:/Conference).

Better carrier option it is more important to adopt the combination of hard and soft skills these are as follows Communication Skills, Design and Planning Skills, Research and Investigation Skills, Information Management Skills, Human Relations and Interpersonal Skills, Critical Thinking Skills, Management and Administration Skills, Valuing Skills, Personal/Career Development Skills.

Skill development is essential for Economic development of Country because the improvement in productivity can be achieved by skilled manpower so the students should directly or indirectly involve in skill development

is essential. Skill should be adopted by students are learning skills, studying skills, listening skills and technical skill. These skills are life long skill used as well as these skills helped to improve personnel and professional growth.

The changing nature of work environments, the emergence of technology-driven processes, and the diversified needs of clientele are the emerging challenges of Higher Education Institutions (HEIs) in order to meet the demand for employable graduates (Same Inanotech, 2014).

IV. CONCLUSION

Present era known as modernization with digitalization. Continuous changes work place demanded skill worker hence as per the demands from various organization highly skilled manpower required hence it is necessary to produce next manpower having knowledge and occupied with hard and soft skills. The skilled labour helps in the economic improvement of Country. It is crystal clear that skill development among students is better opportunities for carrier development.

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Kartoli (Spine gourd) Amazing Wild vegetable

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Scientific name: Momordica dioica

Family : Cucurbitaceae

Local Name: Kartoli

Kartoli which is known as spiny gourd because of its odd texture.The spiky green vegetable makes it naturally unattractive but it is a monsoon vegetable which is not just healthy but also low in calories. Kartoli is wild vegetable that grow naturally without any cultivation or care. Kartoli mainly grow in forests, wilderness, edges of farmlands, and barren fields.

Although kartoli genus is originated from Indo-Malayan region, it is now found to grow in India, Bangladesh, Srilanka, Myanmar, China, Japan, South East Asia, Polynesia, Tropical Africa, and South America . Its cultivation up to an altitude of 1500 meters in Assam and Garo hills of Meghalaya. It is commonly known as spine gourd, teasel gourd or small bitter gourd worldwide whereas in Bangladesh it is known as kakrol and in India as kankro, kartoli, kantoli, kantola, kantroli, ban karola, or janglee karela. Kartoli is about 5–7 meters in length, a popular summer vegetable of which its fruit, young twigs and leaves are used as vegetable. (Sattya and Mohammad (2014))

Climate Conditions Required for Kartoli Farming

Kartoli is a warm and low humid season crop. This vegetable can be cultivated in both tropical and sub-tropical regions. This crop requires good sunshine for better growth and yield. The optimal temperature of about 27 °C to 32 °C is suitable for its cultivation.

Soil Requirement for Kartoli Forming

Kartoli can be grown on sandlylaom to clay soils with pH values 5.5-7.0. Soils with well drainage and good organic matter best suited for its cultivation.

Harvesting of Kartoli

These vegetables will be ready for harvesting for 75-80 days of sowing. In second year, they will become available for picking in 35-40 days. Fruits are picked when they are in tender stage. Alternate days are recommended for harvesting to avoid over mature of vegetables. Hand harvesting can be carried without disturbing the vine. If growing for seed production then leave the fruits on the vine until they ripen fully. Usually, after ripening Kartoli turn the colour from green to orange. One can easily identify matured seeds when the pulp inside the fruit turns into red colour. (Anjana 2020).

Nutrient content of Kartoli

S.No.	Parameter	Nutrient content
Proximate composition		
1.	Water	87 g
2.	pH	6.5
3.	Crude protein	52.06 g
4.	Crude lipid	4 g
5.	Crude fibre	15.36 g
6.	Ash	14 g
7.	Carbohydrate	14.58 g
8.	Total solids	12.9 g
9.	calorific value	302.56 kcal
Vitamin composition		
1.	Vitamin A	2.5
2.	Vitamin B1 (Thiamine)	1.8
3.	Vitamin B2 (Riboflavin)	3.5
4.	Vitamin B3 (Niacin)	1.9
5.	Vitamin B5 (Pantothenic Acid)	18
6.	Vitamin B6(Pyridoxine)	4.3
7.	Vitamin B9 (Folic Acid)	3.6
8.	Vitamin B12 (Cyanocobalamin)	4
9.	Vitamin D2 & 3	3

	(Cholecalciferol)	
10.	Vitamin H (Biotin) g/100g	6.5
11.	Vitamin K (Phytonadione)	15
Mineral Composition		
1	Calcium	26000 mg
2	Magnesium	14000 mg
3	Potassium	370 mg
4	Sodium	58 mg
5	Copper	1.7 mg
6	Zinc	8.5 mg
Fatty acid composition		
1.	Myristic Acid	3.589 %
2.	Palmitic Acid	12.157 %
3.	Stearic Acid	3.547 %
4.	Oleic Acid	56.253 %
5.	Linoleic Acid	22.511 %
6.	alpha-Linolenic Acid	1.943 %

(Salvi and. Katewa 2015)

ytochemical constituents of Kartoli

Total phenols mg/g	Phytic acid (mg/100g)	Trypsin inhibitors (tiu/g)
3.69	284.2	9.3

(Ali Aberoumand 2012)

Here are some health benefits of the vegetable

According to Ayurveda not only kartule fruits have diuretic, laxative, hepatoprotective, antivenomous, antihypertensive, anti-inflammatory, antiasthmatic, antipyretic, antileprosy, antidiabetic, and antidepressant properties but also its leaves have antihelminthic, aphrodisiac, antihemorroidal,hepatoprotective, antibronchitic, antipyretic, antiasthmatic and analgesic properties (Sattya and Mohammad (2014)).

- Reduces blood sugar level in diabetic patients
- Reduces the chances of cancer
- Helps anti-aging
- Improves eyesight
- Reduces excess sweating (Hyperhidrosis)
- High in fiber and anti-oxidants and thus very useful for easy digestion
- Lactating mothers can eat this veggie to decrease the problem of vomiting in infants.
- Great source of phytonutrients and low in calories (Dr.Richa Garge 2016)
- Prevention from Infection
- Helps maintain weight
- Prevents kidney stones
- Improve Eye Vision
- Helps in Skin Problems
- Help for brain health

Tips for Cooking

- Kartoli wash with water and cut .
- Kartoli contain high moisture should be cooked in closed lid pans and by adding a bit of water so that their water content does not evaporate while cooking.
- Also add a bit of water and avoid overcooking. The watery gravy should be consumed as the possible nutrients are actually present in its gravy

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CHAPTER - 8
ENTREPRENEURSHIP THROUGH HOME SCIENCE

Dr. Archana Madhavrao Bhoyar

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UNDERSTANDING OF HOME SCIENCE

When we discuss about Home Science faculty or education it is very necessary to understand about Home Science is a combination of two words i.e. home and science as the word home refers to the place of residence where the family lives while word science refers to knowledge based on facts, principles and laws. Home science can be defined as education for better living and core of all human development and the society at large (www.wikipedia. com).

Home Science means the art of managing your resources efficiently and the science of achieving a healthy and happy home as well as successful career. Home Science draws an important part of its content from pure science disciplines such as physics, chemistry, biology, physiology and hygiene. It also draws its content equally from economics, sociology, anthropology, psychology, community development, communication, media and technology. Thus, making it an interdisciplinary field which draws from the strengths of science and arts courses. (Anonymous A). Home science covers a few areas of specialization such as food and nutrition, communication and extension, resource management, human development, fabric and apparel science (Roy etal2015).

Home science at college level offered in 1932 at the Lady Irwin College at the initiative of All India Women's Conference.

Today, home science is being offered by over 150 institutions of higher learning through private colleges as well as public universities (Vyas and Shastri, 2011).

Education is the most significant instrument for women's development should include education self-reliance, personal development, social development, productive capacity. Home Science education is not only developed to educate the girls merely to obtain the degree but also it provides all over development for enhancing earning capability of women.

One of the major recommendations of the National Policy on Education in 1986 is to promote Empowerment of Women through education. Empowerment is self-governance, self-sufficiency and self-maintenance.

The concept of Women Empowerment was introduced at the International Women's Conference at Nairobi in 1985. Empowerment is a process which includes:

- Equal access to opportunities for using societies resources.
- Prohibition of gender disparity
- Freedom from violence
- Economic independence
- Participation in all decision making bodies.
- Freedom of choice in matters relating to one's life.

Home Science education designed all aspects of personality and other treads for betterment of life .It attained the fullest development in all prospects, personality, socially and economically (Nasareand Tembhare 2019). The study of home science helps each people to lead a more satisfying personal, family and community life because of the knowledge, understanding, skills and appreciation of cultural and spiritual values a pupil acquire through home science education (Ahlawat and Shekhar, 2010).Home Science training realises women their capacity to play a major role in community development. Now-a-days a leadership of women has been recognised by society also.

Scope of Entrepreneurship through Home Science

Before focussing on Entrepreneurship through Hom Science it is necessity to understand the need of Wome Entrepreneurship as our first Prime minister Pandit Jawaharl Nehru said that when women move forward, family moves ar the village moves and the nation moves. Employment give economic independence to women. As per census of India 201 women constitute 48% of Indians population out of this tot 78% engaged in agriculture, 16% in other non-agricultur pursuits with only 6% in household industries. Amongst wome workers in rural area 88% are employed in agriculture area a labors and cultivators. In urban area 80% are employed i unorganized sector like household industries, petty treads an service building and construction etc. Women are activel participating in various agro based and non-agro base enterprise preservation, tailoring, embroidery, knitting, weaning soap and detergent making, candle making, soft toys making rakhi making, painting etc(Nasare and Tembhare 2019).

The role and degree of integration of women in economic development is always an indicator of women economic independence and social status. For economic independence of women there is tremendous scope for Entrepreneurship through Home Science.

The word 'entrepreneur' is derived from the French word 'enterpredre' which means to undertake. In early 16th, the Frenchmen who led military expeditions were referred to as 'entrepreneurs'. According to Mazuyka and Birley entrepreneurship is the process of creating something new of value by devoting the necessary time and effort, assuming the accompanying financial; psychic and social risks and receiving the resulting rewards of monetary and personal satisfaction and independence. Entrepreneurship is seen as any novel activity which creates organizational change and economic value (Mazuyka and Birley, 2012). The term 'entrepreneurship' refers to the functions performed by an entrepreneur. It is the process

involving various actions to be undertaken by the entrepreneur in establishing a new enterprise. Entrepreneurship play a significant role in the socio-economic development of a society.

Skill required for Entrepreneurship:

Entrepreneurs assemble resources including innovations, finance and business acumen in an effort to transform innovations into economic goods. Each era has made entrepreneurs in its age. There are some basics to establish a business. Basics of entrepreneurship these are Calculated Risk-taking, Management skills, Effective Communication, Vision, Connection with efficient people and Strategy.

For success of any Entrepreneurship there is a need of Entrepreneurial skills which helps in build the confidenceto see value in their own ideas thus can then make enterprising choices that are transferable into the workplacethe economic development of the country. Skills needed for Entrepreneurship are technical skills, managerial skills and entrepreneurial skills are needed for entrepreneurship.

(1) Soft skills Soft Skills:

- **Communication**: It is a process of exchanging information among people. It needs effective language, presentation skill, environment etc.
- **Interpersonal relations** : It is a skill to communicate with each other. It is used not only in offices but in our dayto day social life. People with good interpersonal skills are perceived as confident, calm and charismatic.
- **Environmental Observation**: Environmental observation is one of the technical skills. This skill helps in understanding job objective and current scenario of the society with respect to the business that one wants to start
- **Coordination:** It is a skill that helps in understanding other people and work together to achieve the set goal. Coordination must exist among the team members in order to achieve best possible results.

- **Specific operation Technology** :Sometimes specific technology is required for achieving specific goal e.g. Knowledge about computer.

(2) Managerial skills Managerial Skills include the following:

- **Planning** :It is a basic management method involving formulation of one or more detailed plan to achieve the best result. The planning process is to identify goal, formulate strategy and decide the process to be followed to achieve the goal on the same strategy
- **Motivation:** Motivation is defined as goal oriented behaviour. It is frequently used to describe why a person is interested in doing a particular work. Following points help to stay motivated:
  - Surround yourself with positivity
  - Create a vision boar
  - Marketing
  - Accounting
  - Negotiating
  - Make smart goals
  - Reward yourself
  - Believe in yourself
  - Acknowledge your positive attributes
  - Recognize your progress
  - Visualize accomplishing your goals
  - Be kind to yourself
  - Don't compare yourself to other
- **Marketing** :It is an ability through which you sell something or create awareness about something e.g. any product. For example T.V. commercials are a part of marketing. It tries to satisfy needs of clients. It includes the coordination of product, price, place and promotional strategy. These are known as 4 P's of marketing. You have to follow the points mentioned below to ensure maximum sale of your product/service.
  - Identify the product
  - Determine its price

- Reach the customer
- Implement the of promotional strategy

- **Accounting** : It is a process of keeping financial record or preparing financial record. It includes analysis, verification and reporting of records.
- **Negotiating** : It is a process through which people settle all the problems which occur between two or more parties. Parties try to reach at mutual beneficial outcome through negotiation. Process of negotiation includes following stages:
  - Preparation
  - Discussion
  - Goal clarification
  - Arriving at mutual beneficial point
  - Agreement
  - Implementation of strategy

(3) **Entrepreneurial skills It includes the following:**

- **Innovation and Risk Taking Ability** : It is a process of translating new ideas into services that create value. An idea must be replicable at economical cost and satisfy customer's need. Innovation is synonymous with risk taking. An organization that creates new idea, takes great risk of implementing a new market.
- **Persistency**: In this skill, you continue to do something even though it is difficult or even if other people are against it. This skill requires lot of patience and determination.
- **Visionary**: Someone who can visualize the future and take action according to that is visionary. A visionary has clear ideas about what should happen and what strategy can be formed to achieve best possible results.
- **Flexibility:** Flexibility is willingness to change as per the changing environment, for betterment. One should not be stringent about his/her way of working; rather should be able to adapt new ways easily.

Economically, entrepreneurship invigorates markets and promotes job creation through the formation of new businesses. History has shown that economic progress has been advanced by

pragmatic people who are entrepreneurial able to exploit opportunities and willing to take risks. Hence, transforming ideas into opportunities is the crux of entrepreneurship which undoubtedly raises productivity and enhances the transfer of technology. So in this context Home science education knowledge which is an interdisciplinary field of knowledge with focus earlier it focused on industrial view recent scientific information to cope with the day to day problems but today efforts are being made to provide facilities to invigorate. The theoretical knowledge of the students through field training & research laboratories so that they are able to launches entrepreneurship programs successfully.

Specialization of Home Science:

Main Branch	Area for specialization
Food and Nutrition	Food Science Nutrition- Clinical Nutrition and Community Nutrition Institutional food service
Fabric and Apparel Science	Clothing Construction Textile Science Textile Designing Garment Designing Care and Maintenance of Clothes
Resource Management	Resource Management Housing and Equipment Interior Decoration Consumer Education
Human Development	Child - Welfare Adolescence, Marriage and Family Guidance Care of the Elderly Care of special children
Communication and Extension	Media for communication Programme planning and evaluation Training and capacity building Management of community service organisations

Catering: Catering could be provided to fulfill needs of the society.

- Service could be extended for parties arranged at home such as kitty parties, birthday parties or anniversary parties etc.
- Catering could be made at special places like school and hospitals. Besides these, it will be very useful in running canteen in various types of settings.
- The trained professionals can also undertake catering services for people who are working in factories, offices and do not have time or arrangement to cook meals, particularly unit days meals.

Confectionery and Bakery: The Home Science graduates/ postgraduates can set up confectionery, ice-cream Parlors and Bakery.

- They can use innovation skill to evolve their own products which are more nutritive and different from the conventional ones and add variety at parties or at dining table.

Preservation: Preservations of vegetables and fruits in the form of pickles, jams, jellies, marmalades etc.

Ready to cook/Serve food: small units could be established to clean/cut/shell the vegetables so as to make these ready for cooking by the house wife.

- A variety of salads could be prepared to set up salad bar along with fast food to promote healthy living.

Health centers: Health Centre could provide special advice for the dietary needs of people suffering from different diseases.

- Suitable therapeutic nutrition and physical education would enable the home science graduate to set up support centers for people with special dietary needs.

- Guidance could be given to the individuals for keepi through diet and exercise and management of obesit related conditions.

Hobby centers: Hobby Centers could be started to interested people in various culinary art of different region continents.

- Graduates / Post-Graduates can seek jobs as Dietician hospitals, nursing homes and fitness centers; else bec Nutrition Counselors and Nutrition Experts in natio international agencies like ICMR, NIN, CARE, WFP, UNI CRY, Chetna etc.
- Food technologists and researcher entrepreneurs offe health and nutrition consultancy services; in mass me industry as Nutrition Journalists.

Fabric and apparel designing:

- Boutique.
- Dyeing and Printing unit
- Readymade Garment unit
- Embroidery centre
- Weaving unit.

Resource management:

Interior designing: They can impart training in the art o interior decoration.

- Such centres can also provide services for decoration o various settings like offices, hospitals, school.

Hobby centres: Hobby Centres could be started where interested persons could learn

- candle and paper flower making,
- preparation of decorative articles,
- soft toys,
- Rangoli,

- jewellery designing,
- pot making,
- wall painting and making useful articles from the household waste products.

Grooming centres: This area has vast potential to develop among masses.

- Training could be imparted under Home Science education to open grooming centres where they could provide services for skin and hair care.
- The individualized guidance could be extended according to the unique characteristics to select jewellery, hair style and face make up.

Human development:

Child care center: Women participating in income generation actively outside the home had led to the need of child care outside the family. Children usually require care by adults till they are 12 year of age and should not be left alone at home with the basic knowledge of child development, the Home Science graduates can run childhood care units like

- day-care centre
- creche and nursery school
- after school centres.

Old age homes: Increase in the nuclearization of families has compelled many old people to stay in old age homes away from their families. Such old age home can be managed by Home Science graduates where various kinds of activities could be arranged for old people with proper food services and psycho-emotional enrichment.

Rehabilitation centres for children with special needs : Home Science graduate can open rehabilitation centres for children with impaired senses. These centres will not only be a service to the community but would help them create employment for themselves and others.

Communication and Extension:

- Counsellors,
- Running NGOs,
- Consultancy services in consumer protection, savings, investment, etc.

(Sorce: Entrepreneurship In Home Science (scholarshipsinindia.com))

Home science syllabus draw its strength from both science and arts discipline. This enables the students to develop the ability and understand the concept as well as apply them in various situations. This gives home science students an edge above all other disciplines, this prepares them for vast range of opportunities.

Home science is a combination of both art and science that is not only confined to food and nutrition, but also wraps housekeeping, textiles, dietetics, clothing, family relations, community living, sociology, economics, child development and hygiene. Home science education provide skill and knowledge which makes them optimistic. Home Science offers more scope for self- employment compared to other subjects.

Home science can enrich the student economically and can make them independent as well as self-reliant. At the endit can be noted that home science which is an interdisciplinary field of knowledge having lots of opportunity for women entrepreneurship and thus make a particularly strong contribution to the economic well-being of the family and communities, country poverty reduction.

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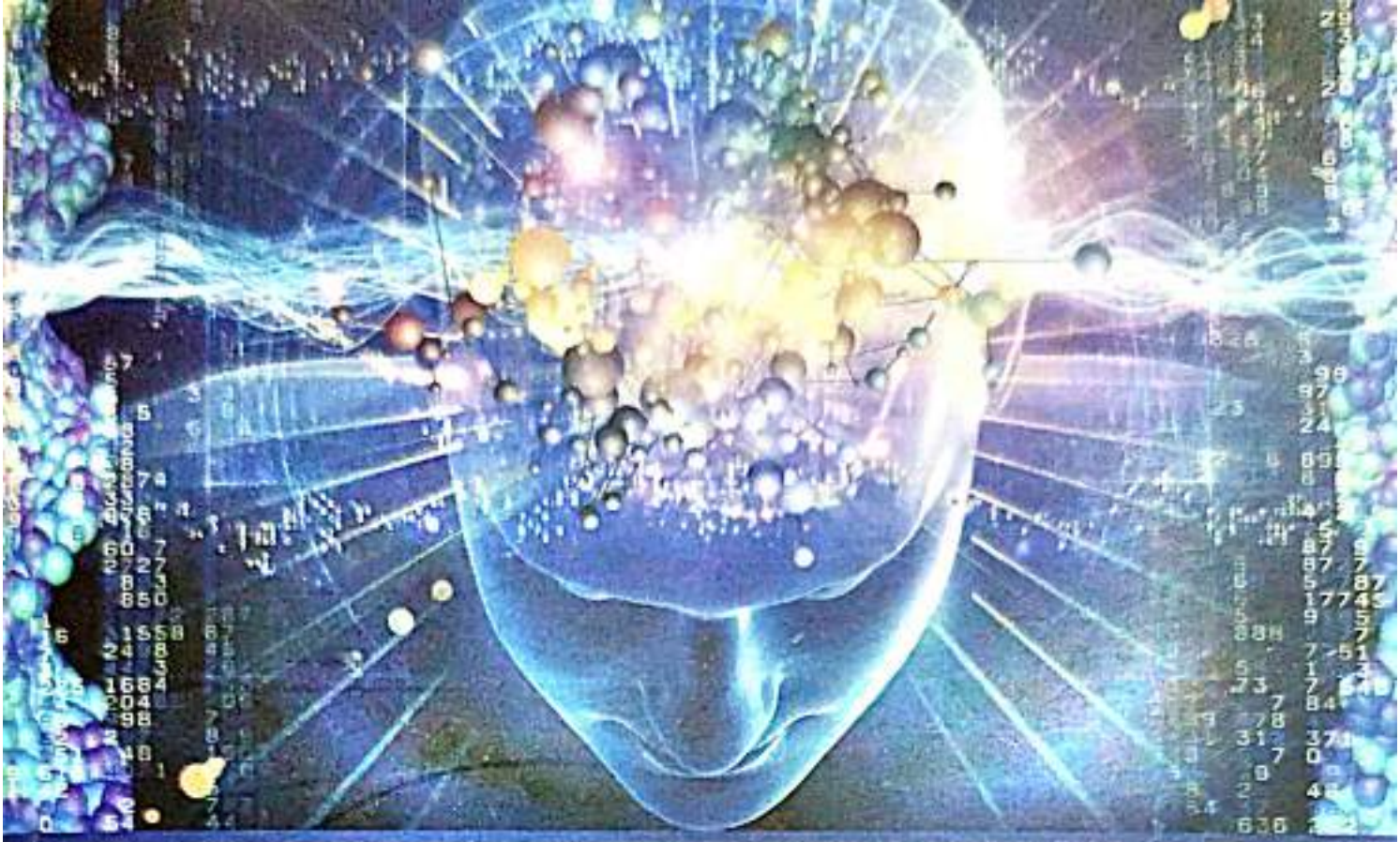

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CHAPTER 14

A REVIEW ON HEALTH BENEFITS OF MILLETS

Dr. Archana Madhavrao Bhoyar

Abstract:

Year 2023 is declared as "Millet Year" in this context it is important to know about the millets, health benefits of millets. Using secondary data assessed the health benefits of Millets. Millets tolerant to drought and extreme weather condition was rich in nutrients. Its unique chrematistics makes health prompting. Millets were beneficial for diabetes management, CV, celiac, obesity etc. Hence it is recommended that Millets should be consumed in regular diet for maintain good health.

Key words: *Millets, climate, production of Millets, nutritional composition, heath beneficial.*

Introduction:

Government of India had proposed to United Nations for declaring 2023 as International Year of Millets (IYOM). The proposal of India was supported by 72 countries and United Nation's General Assembly (UNGA) declared 2023 as International Year of Millets on 5 th March, 2021. In this view it is necessary to about the Millets. Millets are known as one of the most important cereal grains. Millets are consumed by more than 1/3rd of the world's population. It is the 6th cereal crop in terms of world's agricultural production. According to Oxford Dictionaries Millets are defined as a type of plant that grows in hot countries and produces very small seeds. The seeds are used as food, mainly to make flour, and also to feed to birds and animals.

History:

Millets are cultivated for a thousand years and used throughout the world, in the Middle Ages the Romans and Gauls were consuming porridges made of millets eaten than wheat. A majority of the world's commercial millet crop is produced by China, India, Greece, Egypt

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and Africa. (Kimeera Ambati and Sucharitha K V, 2019). Millets are traditional grains, grown and consumed in the Indian subcontinent from the past more than 5000 years. India is the world's largest producer of millet. (Sujata Bhat, C. Nandini, V. Tippeswamy and Prabhakar 2018).

Climate:

Millets are small - grained, annual, warm - weather cereals belonging to grass family. They are rain - fed, hardy grains which have low requirements of water and fertility when compared to other popular cereals. Millets are highly tolerant to drought and other extreme weather conditions.

Production of Millets:

As per worldwide production of Millets it was found that out of the total 93 millet growing countries of the world), only 7 countries (India, Niger, Sudan, Nigeria, Mali, Burkina Faso, and Chad) have more than 1 M ha harvested area, whereas around 25 countries have more than 0.1 M ha harvested area. Together all contribute around 97% of the total world millet harvested area (34.1 M ha). Among the top seven millet growing countries of the world, India ranked first with 15.29 M ha harvested area followed by Niger (7.03 M ha), Sudan (3.75 M ha), Nigeria (2.7 M ha), Mali (2.15 M ha), Burkina, Faso (1.39 M ha), and Chad (1.22 M ha). India being the largest grower of millets contributes about 26.6% of the global harvested area (FAOSTAT 2018).

Common name for Millets:

S.No	English Name	Scientific name	Local Name
1	Pearl millet	*Pennisetum glaucum*	Bajra
2	Finger millet	*Eleusine coracana,*	Ragi / Nachani
3	Foxtail millet	*Setaria italica:*	Korra/Navane
4	Little millet	*Panicum sumatrense*	Sama
5	Sorghum	*Panicum sonorum*	Jowar
6	Kodo	*Paspalum scrobiculatum:*	Haarka
7	Proso millet	*Panicum miliaceum*	Chena
8	Barnyard millet	*Echinochloa frumentacea*	Sanwa / Bhagar

Nutritional Composition of Millets:

Kimeera and Sucharitha (2019) reviewed that Millets have 65% carbohydrates, 9% proteins, 3% fat, and 2- 7% crude fibre and vitamins and minerals. Millets are a good source of vitamin B, magnesium, antioxidants, manganese, phosphorus and iron. Millets

are good source of essential amino acids except for lysine and threonine but are relatively high in sulphur containing amino acids methionine and cysteine also good source essential fatty acids like linoleic, oleic and palmitic acids found in their free form and monogalactosul, diacylglycerols, digalactosyl diacylglycerols, phosphatidylethanolamine, phosphatdyl serine and phosphatidyl choline in the bound form present in millets. Other fatty acids i.e. arachidic acid, behenic acid, erucic acid are found in trace amounts. Millet oil a good source of linoleic acid and tocopherols. Millet is an alkaline forming grain that is gluten-free. Vitamin B such as Niacin, folacin, riboflavin, and thiamine and phosphorus are present in millets that play a key role in energy synthesis in the body. So, it is essential to aware about nutritional composition of Common Millets.

Nutritional Composition of Millets per 100 g

Crop/ nutrient	Protein (g)	CHO (g)	Energy (Kcal)	Fiber (g)	Minerals (g)	Iron (mg)	Calcium (mg)
Sorghum	11	70.7-72.9	329-349	6.7	2.7	3.4	13
Finger millet	7.3	71.52-72	328-336	3.6	2.7	3.9	344
Foxtail millet	12.3	60.9-67.3	352-391	8	3.3	2.8	31
Kodo millet	8.3	63.82-66.6	349.5-353	9	2.6	0.5	27
Little millet	7.7	60.9-67	329-341	7.6	1.5	9.3	17
Pearl millet	10.6	67.0-69.10	361-363	1.3	2.3	16.9	38
Proso millet	12.5	67.09	352.5	2.2	1.9	0.8	14
Barnyard millet	11.2	55-65.5	300-307	10.1	4.4	15.2	11

Table 2. Micronutrient contents of millets

Crops	Na (mg)	K (mg)	Mg (mg)	Zn (mg)	Carotenee (µg)	Thiamine (µg)	Riboflavin (µg)	Niacin (µg)
Pearl millet	10.9	307.0	137.0	3.1	132.0	0.33-0.38	0.21-0.25	2.3-2.8
Foxtail millet	4.6	250.0	81.0	2.4	32.0	0.59	0.11	3.2
Finger millet	11.0	408.0	137.0	2.3	42.0	0.42	0.19	1.1
Proso millet	-	-	-	-	-	-	-	-
Barnyard millet	-	-	82.0	3.0	0	0.33	0.10	4.2
Kodo millet	-	-	-	-	-	0.15	0.09	2.0
Little millet	8.1	129.0	133.0	3.7	0	0.30	0.09	3.2
Sorghum	7.3	131.0	171.0	1.6	47.0	0.37-0.38	0.13-0.15	3.1-4.3

Source: Nutrient value of millets, Nutritive value of Indian Foods, Gopalan (2010)

Table 3. Essential amino acid content in millets.

Amino acids	Foxtail Millet (defatted flour)	Proso Millet (dehulled grain)	Pearl Millet (true prolamine)	Finger Millet (native grain)	Foxtail Millet (defatted flour)
Histidine	1.3-2.11	2.1	1.4-1.7	1.3-2.3	1.3-2.11
Lysine	1.4-1.59	1.5	0.5-1.9	2.2	1.4-1.59
Isoleucine	4.59-4.8	4.1	2.6-5.1	4.0-4.3	4.59-4.8
Threonine	1.9-3.68	3	2.4-3.3	2.4-4.3	1.9-3.68
Methionine	1.8-3.06	2.2	1-1.5	2.5-2.9	1.8-3.06
Valine	4.3-5.81	5.4	3.3-4.2	4.8-6.3	4.3-5.81
Tryptophan	0.6	0.8	1.1-1.2	1	0.6
Leucine	10.4-13.6	12.2	7.5-14.1	6.5-10.8	10.4-13.6
Phenylalanine	4.2-6.27	5.5	2.9-7.6	3.1-6	4.2-6.27

Health benefits of Millets:
Millets are highly adaptive to a wide range of ecological conditions and thrive well in rain-fed; arid climate and the minimal requirement of water, fertilizers, and pesticides.

Health-promoting nutritious crop:
Compared to other cereals they have superior micronutrient profile and biflavonoids. Millets are high in nutrition and dietary fibre. They serve as good source of protein, micronutrients and phytochemicals. The millets contain 7-12% protein, 2-5% fat, 65-75% carbohydrates and 15-20% dietary fibre. The essential amino acid profile of the millet protein is better than various cereals such as maize. Millets contain fewer cross-linked prolamins, which may be an additional factor contributing to higher digestibility of the millet proteins. Similar to cereal proteins, the millet proteins are poor sources of lysine, but they complement well with lysine - rich vegetables (leguminous) and animal proteins which form nutritionally balanced composites of high biological value. Millets are more nutritious compared to fine cereals. Small millets are good source of phosphorous and iron. Millets contributes to antioxidant activity with phytates, polyphenols, tannins, anthocyanins and phytosterols present in it having important role in aging and metabolic diseases. All millets possess high antioxidant activities.

Diabetes :
Diabetes mellitus is a chronic metabolic disorder characterised by hyperglycaemia with alteration of protein, carbohydrate and lipid metabolism. Use of natural inhibiting diet is preferably safer in the management of hyperglycaemia as dietary glycaemic load is directly correlated with increased risk of diabetes. Further, fibre plays a significant role in glycaemic control. Richness of millets in dietary fibre and minerals and slowly digestible starch with leucine make millet a healthy diet for diabetics.

Diabetes is a disease is found in millions of people throughout the world. Millets help in prevention of Type II Diabetes due to their significant levels of magnesium. Magnesium is an important mineral which helps in increasing the efficiency of Insulin and glucose receptors by producing many carbohydrate digesting enzymes, which manages insulin action. (O.S.K.Reddy, 2017).

Millets have a low Glycaemic Index (GI) and also associated with the prevention of diabetes.

Type of Millet Glycaemic Index Score

Name of Millets	GI
Barnyard millet	50
Little millet	52
Proso millet	50-64
Pearl millet	54
Foxtail millet	59
Kodo millet	58-67
Finger millet	104

• Millets are gluten-free and can be consumed by celiac disease patients.

Millet is gluten-free, therefore an excellent option for people suffering from celiac diseases often irritated by the gluten content of wheat and other more common cereal grains. It is also useful for people who are suffering from atherosclerosis and diabetic heart disease (Gélinas et al., 2008).

• Millet has a beneficial effect on the management and prevention of hyperlipidemia and risk of CVD

Obesity, smoking, unhealthy diet and physical inactivity increase the risk of heart attacks and strokes. Most of the world countries face high and increasing rates of cardiovascular disease. It has been demonstrated that rats fed with diet of native and treated starch from barnyard millet had the lowest blood glucose, serum cholesterol and triglycerides compared with rice and other minor millets (Kumari and Thayumanavan 1997). Finger millet and proso millet may prevent cardiovascular disease by reducing plasma tri glycerides in hyper lipidemic rats (Lee et al., 2010)

• Millets are found to be helpful with the reduction of weight, BMI, and high blood pressure :

Kimeera and Sucharitha (2019) revealed in their review study on millets with the help of various studies that Obesity is the biggest emerging problem in India and it is associated with several chronic diseases including diabetes and CVD. Recent studies show that intake of high dietary fibre decreases the incidence of obesity The dietary fibre content present in millets is 22% which is comparatively higher than other cereals like wheat having 12.6%, rice having 4.6%, maize having 13.4%. According to Chethan, et al., (2007), reported that there is 15.7% insoluble dietary fiber, 1.4% soluble dietary fiber, in

finger millet grain. As we know that dietary fibres are classified into soluble fibres and insoluble fibres. Now a days it is seen that Obesity has become an emerging problem which is associated with several other diseases like Diabetes, Blood pressure and Cardiac problems. Studies suggested that consuming high fibre food helps in improving the bowel function and reduce the prevalence of Obesity by improving the digestion and absorption in the body thereby reducing the risk of chronic diseases. Millets helps in satiating hunger satisfaction and helps in weight management reducing obesity. With high fibre content, millets help to reduce problems like constipation, flatulence, bloating and stomach cramping.

Conclusion:

Millets is considered as minor crop which survive extreme weather and climatic condition known by ancient era. Millets are nutritious and beneficial for resistance of life style disease. Its consumption and use in commercial production should be increase. As this year is celebrating Millet year so, it is most important to aware about millets for getting its benefits.

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Age of Miracles- Teenagers

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AGE OF MIRACLES- TEENAGERS

Dr. Mrs. Varsha Gopal Dodiya
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Salient Features of the Book

- To find out the socio-economic background of selected adolescent girls
- To assess the nutritional status of selected of selected adolescent girls by anthropometric measurements
- To assess the prevalence of under nutrition on the basis of BMI among selected adolescent girls
- To evaluate the food consumption pattern of selected adolescent girls by means of food and nutrient intake, percent adequacy of food and nutrients
- To identify prevalence of anaemia among selected adolescent girls.

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