Research Article

Food and Energy Intakes of Adolescent Girls from Different Deprived Communities

G. Nagamani

Department of Home Science, Sri Padmavathi Women's Degree and P.G. College, Affiliated S.V. University, Tirupati, Andhra Pradesh, India

Abstract The increase in energy needs with age reflects increase in the energy needed by basal metabolism, increased activity and increased growth of muscle and adipose tissue. The present investigation was undertaken and with a major objective of assessing the energy intakes of female adolescent girls (10-18 years) residing in rural areas and urban slums of Chittoor District. A group of age matched urban elite girls was also studied who acted as experimental control. The study sample of girls was selected by adopting multi stage sampling technique. The dietary survey of all the subjects was carried out to get food intake data for 3 alternated days in a week and by one day weighing method. Thus mean of 3 days in take was considered and mean of 3 days energy intakes were compared with recommended allowances of ICMR. SPSS 13 was used for statistical analysis, student t-test and analysis of variance was done for comparison among 4 different communities for dietary in takes. Results found that the mean calorie intakes of rural S.C. (RSC) as well as urban slum (USL) were far below the ICMR, RDA values in all age groups. The calorie gap ranges from 347-848 Kcal. Urban elite girls are better in their energy intakes than rural forward caste (RFC), Rural Scheduled Caste (RSC) and urban slum girls (USL). The difference between RDA and the intakes of calories by girls are statistically significant at 1% level. This trend is observed in all age and community groups. The calorie gaps present an important picture that growing girls from 10 years onwards are consuming roughly 500-800 kcal less than the ICMR, RDA. This high gap, calorie insult is an important causative factor for high incidence of chronic energy deficiency, under nutrition and low body weight of girl children. All these girls with poor nutritional status are running with negative energy balance which affects their physical work capacity and their overall nutritional status. Long term interventions are necessary for better in growth and the bio-chemical levels.

Keywords Chronic energy deficiency; Diet survey; Nutritional status; Negative energy balance; Physical work capacity

1. Introduction

Growth does continue throughout childhood, however, and must sustain by an adequate supply of nutrients. Children tend to grow in spurts, and so the nutrients available in their diet at all times should be able to meet the demand for nutrients during growth spurts. The dietary standards for children proposed by the food and nutritional board represent the intakes believed to promote optimal health in practically all children in each age-group. In times of rapid growth, these standards are probably providing realistic estimates of the amount of nutrients required. Firm experimental evidence to back

up the dietary standards is available for a few nutrients. Some other standards are based on extrapolation from information on adult needs. The remaining standards simply reflected the level of the nutrients that are known to be consumed by apparently healthy children.

The increase in energy needs with age reflects increase in the energy needed by basal metabolism, increased activity, and increased growth of muscle and adipose tissue. Recommended energy intakes make no distinction between boys and girls until age 11. Several studies, however, indicate that boys as young as 6 have greater energy needs as do girls and that the boys eat more to met their greater needs.

Many water-soluble vitamins are involved in energy metabolism, including thiamin, riboflavin, niacin and pantothenic acid. Accordingly, the needs for many water soluble vitamins increase in proportion to total energy needs. Pyridoxine is required in greater amounts during periods of rapid tissue growth, reflecting this vitamin's role in the use of dietary proteins and the synthesis of new tissue protein. The increase in muscle mass during growth requires that positive nitrogen be maintained. This is usually ensured by daily consumption of 1.5 to 2g of protein per kilogram of body weight. Nutrients involved in blood formation are also important during growth because the vascular system must grow to bring blood to all new cells. This increase in the vascular system demands adequate supplies of iron, protein folate and pyridoxine. Bone growth creates need for calcium, phosphorous, fluoride and vitamin D. The body needs for vitamin A and C is believed to increase during growth because of the involvement of vitamin A in bone growth maintaining epithelial cells involvement of vitamin C in the synthesis collagen.

2. Materials and Methods

The present investigation was undertaken with a major objective of assessing the dietary energy intakes of female adolescent girls (10-18 y) residing in rural areas and urban slums. A group of age matched urban elite girls was also studied who acted as experimental control. The present study aims at purposive sampling of growing girls from deprived communities like rural, rural scheduled caste, urban slum in relation to a control group of urban elite. The deprived castes, age, literacy status, the economic status and the food they eat, the practices they follow form as independent variables which affect and alter the depended variables i.e., growth and development, nutritional status and physical work capacity of girl children. Chittoor District of Andhra Pradesh was selected as the study area.

The district consists of 66 mandals and by random sampling, ten rural mandals were selected. From each mandal, two villages i.e. a total of 20 villages from ten mandals having separate harizanawadas (the place the SC, ST population live) were selected. Further from each village, families consisting girls aged 10 to 18 year old were identified and number was noted both from main village area and harizanawadas of the village. For urban control group (Age matched) high socio-economic families having girls from Tirupati and Chittoor were selected and girl population was identified and noted. The study sample of 10 to 18 year old girls both from rural, SC, ST, urban elite and urban slum were selected by adopting multistage sampling technique. This was done to maintain the characteristic of homogeneity among the sample.

In each village selected (20 villages), the total population of girls from 10 years onwards was surveyed. By following demographic variables the study sample of rural and urban girls were classified into four groups as RFC, RSC, USL and UE. Girls from main village and forward castes form as rural forward caste girls (RFC) and girls from rural SC and ST colonies form as girls of deprived communities (RSC). To match this two groups, urban girls from main urban towns of Tirupati and Chittoor areas of high socio-economic and elite families studying in public schools. The urban elite group (UE) acted as control and girls from different slums and deprived communities of these two urban areas formed as the fourth group as urban slum (USL) covering slum deprived families.

Table 1: *Age wise distribution of experimental subject from four select different communities*

Age in years	Age and number of girls studied from four communities			
	Urban Elite (UE)	Urban Slum (USL)	Rural Forward Caste (RFC)	Rural Scheduled Caste (RSC)
10+	25	30	30	30
11+	25	30	30	30
12+	25	30	30	30
13+	25	30	30	30
14+	25	30	30	30
15+	25	30	30	30
16+	25	30	30	30
17+	25	30	30	30
18+	25	30	30	30
Total no.	225	270	270	270

The selected sample units of 1035 girls covering 9 age groups with an interval of one year i.e., from 10 years to 18 years i.e., 10+, 11+, 12+, …., 18+, etc. From each age group, 30 girls from RFC, 30 girls from RSC, 30 girls from USL and 25 from UE were studied. A total of 115 numbers in each age group were chosen for the study. Thus, a representative sample of 270 from RFC, 270 from RSC and 270 from urban slum (USL) formed as experimental groups covering 9 age groups. Urban elite (UE) group of 225 numbers acted as experimental control group. The distribution of the study sample is presented in Table 1.

Table 2: *Mean caloric intake of rural and urban adolescent girls from different deprived communities. A comparison with urban elite (control) and recommended dietary allowances (ICMR) along with calculated 't' and 'F' values for the differences*

Age (years)	ICMR RDA Kcal (R_1)	Mean Caloric intake (Kcal) and related 't' values against R_1 and between groups								
		UE Mean	t value (R_1 vs. UE)	USL mean	T value (R_1 vs. USL)	RFC mean	t value (R_1 vs. RFC)	RSC mean	t value (R_1 vs. RSC	\$ F value (UE vs. USL RFC, RSC)
10+	1907	1810.59 81.51±	4.99**	1124.73 ±63.58	16.82**	1332.17 ±53.05	19.35**	1089.92 ±55.51	16.54**	610.22
11+	1956	1825.88 ±82.49	2.73**	1148.93 ±39.21	18.33**	1390.47 ±33.70	10.16**	1109.87 ±16.41	19.49**	1101.13
12+	2032	1863.20 ±42.31	3.40**	1274.07 ±39.30	19.64**	1468.11 ±56.38	18.53**	1166.33 ±28.27	14.37**	174.08
13+	2.37	1891.64 ±48.13	8.38**	1275.87 ±57.96	16.48**	1542.97 ±52.06	12.64**	1288.93 ±28.27	14.37**	174.08
14+	2060	1917.04 ±87.99	9.12**	1359.13 ±30.47	13.32**	1564.73 ±17.35	15.36**	1395.27 ±12.20	20.66**	883.74
15+	2060	1921.16 ±44.32	16.55**	1437.53 ±65.29	17.13**	1575.87 ±82.27	17.52**	1397.27 ±12.20	20.66**	883.74
16+	2060	1932.72 ±44.32	15.48**	1451.80 ±61.39	10.22**	1666.67 ±64.61	11.95**	1591.93 ±16.05	11.95**	850.75
17+	2060	1991.20 ±25.89	11.74**	1651.60 ±65.02	10.50**	1852.40 ±70.94	14.30**	1619.20 ±11.53	14.46**	1480.77
18+	2060	1994.56 ±17.96	18.22**	1678.07 ±74.63	13.88**	1872.83 ±70.53	17.37**	1668.47 ±24.06	11.93**	2010.83

* p<0.05 R1 ICMR, 1972; ** p<0.01 r2 NCHS, 1983
$ - 'F' value obtained from one way analysis of variance for comparison among the means due to the four groups.

Diet surveys are an essential part of any complete study of the nutritional status of individuals or groups. They give useful information on nutrient intake levels, sources of nutrients, food habits and attitudes. The dietary survey of all the households/subjects was carried out to get food intake data for 3 alternate days in a week and by one day weighing method. A standard food weighing machine was used to measure actual food intake in terms of both cooked and raw food weights. Thus, a mean of 3 days intake was considered. Accordingly, nutritive values of the diets were calculated using food values book of ICMR, India (Gopalan et al., 1993). The mean values for all nutrient intakes of girls were compared with recommended dietary allowance of ICMR. SPSS 13 (statistical package for social sciences) was used for statistical analysis. Student t-test was done to find out significant difference with standard values. One way analysis variance (ANOVA) was done for comparison among four different communities.

3. Results and Discussion

The mean caloric intake of rural and urban girls was presented in the Table 2 and compared with RDA (ICMR). The calorie intakes of girls of rural SC (RSC) as well as urban slum (USL) were far below the ICMR, RDA values in all age groups. The caloric gap ranges from 347-848 Kcal. The intake ranges from 1089.92 Kcal to 1994.56 Kcal. Urban elite girls are better in their intakes than RFC, RSC and USL girls. The deficit against RDA in UE girls was lowest i.e. 5.05% to 8.30% where as in RSC girls, it was high 19.00 to 42.84% in all the age groups, respectively. It is observed that among the four different communities, rural horizon and urban slum girls are worst affected and had significantly deficit intakes than RFC and UE girls. At all age levels, the mean in takes of RSC and USL satisfy only 56.73 to 67.82 percent of the caloric commendation. It is clearly evident from the Table no. 2 as age increases, the percent deficit also decrease to some extent.

The differences between RDA and the intakes of calories by girls are statistically significant at one present level. This trend is observed in all the age and community groups. When the girls is at 10 year old, the ICMR, RDA is 1907 Kcal., the intakes by UE was 97 less by ICMR, RDA whereas it was with RFC is 574 and with RSC is 817. These observations clearly indicate that the most affected groups are RFC, next USL and it was RFC, respectively, Comparatively the UE, the control group consuming much better than the other three deprived groups. There was an also significant difference between the caloric intakes of UE, USL, RFC and RSC.

Table 3: *Calorie gap in the intakes of rural and urban adolescent girls' different communities as against ICMR recommended dietary allowances.*

Age (Years)	ICMR RDA (RI) calories (Kcal)	Calorie gap (K. Cat) in the intakes of four different communities as against RDA			
		UE Mean	USL Mean	RFC Mean	RSC Mean
10+	1907	97.00	782.27	574.83	817.08
11+	1956	130.12	807.07	565.53	846.13
12+	2032	168.80	757.93	563.89	865.67
13+	2037	145.37	761.13	494.03	748.07
14+	2060	142.96	700.87	495.87	664.47
15+	2060	138.84	622.47	484.13	662.73
16+	2060	127.28	608.20	399.33	468.67
17+	2060	68.80	408.40	207.60	440.80
18+	2060	65.44	381.93	187.17	391.53

The calculated 6F' values are significant at one percent level between UE vs. USL, RFC and RSC indicating that the control (UE group) consuming calories much better way than the girls from deprived communities. Both the calculated 4t' values of significant for the differences as against ICMR RDA

and 'F' values between the groups are significant at one percent level indicating that girls from deprived communities are consuming significantly less than the ICMR and UE.

The calorie gaps are presented in Table 3 on caloric gaps present an important picture that growing girls from 10 years onwards are consuming roughly 500-800 Kcal less than the ICMR, RDA. This high gap, calorie insult is an important causative factor for higher incidence of chronic energy deficiency, under nutrition and for low body weight of girl children. Krishna Swamy, K. (2000) reported out that an average gap of 500 Kcal observed among the poor communities. The principal cause for under nutrition is of course inadequate dietary intake. Owing to the increased demands of growth in adolescence, the dietary intakes of adolescent girls also fall short of the RDA. Computation of dietary intake in adolescent girls' shows that 25% of them eat less than 70% of requirements of energy; and 15% consume protein less than 70% of the RDA. Kusuma, D.L. (1996) observed that at all age levels, the mean intakes of calories are below the RDA. The intakes satisfy only 67 and 68 percent of the calorie recommendation at 10 and 11 years. NNMB (1972-97) also reported that in the case of energy, the consumption showed a declining trend from 1982, and was below the RDA.

4. Conclusion

From the results, it is to note that income and education are considered to be two of the most important factors influencing nutritional status. In the present study, UE (control) girls influenced their intakes over three different communities. UE girls belonged to better socioeconomic status and better education facilities makes it possible for them to select better foods to meet their personal needs. Well-educated individuals are thought to choose their foods in more informed way. Thus we are able to calorie intakes of girls from different deprived communities. So, that better designs for well targeted nutrition interventions strategies could be established.

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