FOODS AND NUTRITION NEWS

Acharya N.G. Ranga Agricultural University

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The Adolescent Girl-Nuritional Status

The year 2003 was declared as the year of the Adolescent girl by the government of Andhra Pradesh to focus attention on the health, nutritional and social status of the adolescent girl and to sensitize people on the special needs of adolescent girls.

Adolescence is a crucial phase in life with rapid growth and intense activity. This period comprises nearly half of the growing period of humans, in which a series of physical, emotional and mental changes occur. It is a period of transition from childhood to adulthood.

The term Adolescence has been defined by WHO as the period between 10 to 19 years of age, though in India, it is considered to be between 10 to 18 years. Adolescent growth spurt begins in girls at the age of 10 or 11 years and reaches a peak at 12, being completed at about 15 years.

Adolescence is an anabolic phase of life during which there is accelerated growth and all round development. This in turn enhances the requirement for various essential nutrients. Table 1 shows the nutrient requirements of adolescent girls. There is a need to emphasize good dietary planning to meet the recommended quantities of all nutrients.

Table : 1 Nutrient requirements of Adolescent girl per day

	10 – 12 yr	13 – 15 yr	16 – 18 yr
Protein (g)	57	65	63
Energy (kcal)	1970	2060	2060
Calcium (mg)	600	600	500
Iron (mg)	19	28	30
Vitamin A (µg)	600	600	600
Thiamine (mg)	1.0	1.0	1.0
Riboflavin (mg)	1.0	1.2	1.2
Nicotinic acid (mg)	13	14	14
Ascorbic acid (mg)	40	40	40
Folic acid (mg)	70	100	100

Kofi Annan, Secretary General of UNO stressed the importance of sound nutrition which has the potential to change children's lives by improving their physical and mental development, protecting their health and laying a firm foundation for future productivity. Food intake is reflected in the growth and development of a child. Reaching their maximum genetic potential in height and gaining appropriate weight for height takes place only by providing the necessary nutritional support. Poor food and nutrient intake compromises growth and affects the lives of adolescents irreversibly. Adolescent girls have often been an underprivileged group in Indian society. Sufficient care and attention is not given to them and they are often overburdened with work both at home and outside. Added to these is the stress of physical changes taking place in them-the onset of the menstrual cycle and the growth spurt of adolescence increase the demand for nutrients on one side and also lead to a loss of essential

micronutrients like iron on the other side. The deficiency of various nutrients in the adolescent girl could lead to impaired immune competence, reduced cognitive function and scholastic achievement, growth failure, anemia, increased morbidity and delayed menarche. If proper nutriture is provided on time, there is a potential for catch up growth. But cephalopelvic disproportion may not be avoided, hence leading to problems at a later stage during pregnancy and child birth. Thus the adolescent girl is at the cross roads where if she treads the path of good nutritional and health care, she can achieve optimum growth and a healthy reproductive life which in turn will affect the health and life of her off spring at a later date. On the other hand if she continues with a deficient diet not only will her health and nutrition be compromised, but her offspring, the future citizens of the country will inturn be affected. Therefore it is essential that special care be taken of these *'mothers to be'*.

Studies conducted during the past three decades by the Department of Foods and Nutrition, Acharya N. G. Ranga Agricultural University, showed that micronutrient deficiencies are the major nutritional problem among adolescents. Among the various deficiencies seen, iron deficiency anemia (WHO classification) was prevalent among a majority of adolescent girls studied.

Collection of blood for haemoglobin estimation

In Andhra Pradesh studies have reported 22-92% prevalence of anemia among adolescent girls. Despite efforts by the government and other agencies, the prevalence continues to be high. With an objective of addressing this problem the government of Andhra Pradesh with World Bank support has formulated the 'Kirhore Balika Pathakam' and is implementing it through the Women Development, Child and Disabled Welfare Department. This programme, specially targetting the adolescent girl, focuses attention on increasing the percentage of literacy, raising the age of marriage to 18 years in practice and increasing usage of iron-folic acid tablets by atleast 30% of the adolescent girls.

Table 2: Classification of anemia

Classification	Hemoglobin (g/dl)
Normal	12.0
Mild	10.0 to 11.99
Moderate	7.0 to 9.99
Severe	< 7.0

Source: De Maeyear et al, WHO (1989)

Today there is a recognition by the government of the special needs of the adolescent girl whose well being will greatly improve the quality of life of the future generations and enable the state to make impressive gains in all vital human development indicators.

MICRONUTRIENT STATUS OF ADOLESCENT GIRLS IN ICDS PROJECT AREA OF RANGA REDDY DISTRICT A.P.

In a collaborative study adolescent girls were randomly selected from six villages in Medchal Mandal of Ranga Reddy district, Andhra Pradesh where a world bank aided ICDS programme was in operation and they were grouped as per their age into three groups. There were 100 girls in the age group of 12-14 years, 68 girls in 14-16 years group and 72 girls in third group of 16-18 yrs. Anthropometric data, food and nutrient intake and personal data regarding menarche was collected from these subjects. Blood samples were drawn from each subject to find out their micronutrient (Iron, Zinc and Vitamin A) status. The results of this study are given in Tables 1-3.

Data in Table 1 indicates that in all the age groups the height and weight of the girls was below the NCHS standards. This same trend was also noticed in their nutritional status classified according to Gomez. The 12+, 13+ and 17+ age groups had more numbers of normals than the other groups where as 16+ age group had a higher proportion of girls in grade I and II malnutrition.

Table 1: Mean height, weight and nutritional status of adolescent girls (Gomez classification)

Age Years	Height (cm)		Weight (kg)		*Nutritional status (Gomez)				
	**IAP standard	Mean	IAP standard	Mean	Normal >80%	Grade I 70-80%	G II 60-70%	G III 50-60%	G IV <50%
12+	148.0	143.2	38.7	35.2	78.9	15.8	5.3	Nil	Nil
13+	155.0	147.0	44.0	38.8	83.8	16.3	--	Nil	Nil
14+	160.8	149.8	51.2	40.3	48.53	42.64	8.83	Nil	Nil
15+	161.97	149.86	54.4	40.6					
16+	162.55	150.0	56.15	42.83	41.0	47.0	11.0	Nil	Nil
17+	163.50	151.08	56.15	44.03	69.0	28.0	8.0	Nil	Nil

* ICMR, 1998

** Indian Academy of Pediatrics (1972)

The percent nutrient intake in all age groups was less than the recommended nutrient intake (Table 2). The micronutrient intake in all the age groups was only 45-80% of RNI. Iron intake was very poor (44-68%) compared to other nutrients.

Table 2: Per cent adequacy of nutrient intake by the adolescent girls

Nutrients	Age (years)									
	12+		13+		14+	15+	16+		17+	
	% adeq-uacy	RNI	% adeq-uacy	RNI	% adeq-uacy	RNI	% adeq-uacy	RNI	%adeq-uacy	RNI
Energy	78.2	1970	88.9	2060	79.4	2060	88.71	2060	91.27	2060
Protein	69.6	57.0	69.8	65.0	71.8	65.0	68.04	63	63.09	63
Vitamin A	81.5	1400	70.3	1400	74.9	2400	61.96	2400	56.18	2400
Vitamin C	70.8	40	76.8	40	154.0	40	70.96	40	78.5	40
Calcium	33.6	600	46.5	600	50.7	600	75.08	500	77.12	500
Iron	44.3	19.0	67.7	28	48.0	28.0	52.8	30	59.33	30
Zinc	74.9	10.0	80.2	10	68.6	15.5	--	--	--	--

A higher prevalence of iron deficiency was seen in all age groups than the deficiency of other two micronutrients studied. Girls in the 16-18 years age group had an even higher prevalence of iron deficiency. Zinc deficiency was mild in all the age groups, except in 13+ age group. Vit A deficiency was higher in 14-15+ age group than other groups studied.

Table 3: Prevalence of micronutrient deficiency in adolescent girls

Age (years)	Iron (%)	Zinc (%)	Vit. A (%)
12+	61.1	42.5	35.2
13+	66.0	71.0	31.9
14+ and 15+	78	33.8	72.1
16+	86.22	56	25
17+	83.40	53	31

This study shows, that the micronutrient status of 12-18 yrs girls is poor and iron is the most deficient nutrient. Immediate implementation of Kishore Balika Pathakam to improve iron nutritional status of the adolescents was suggested.

Shantisri G., Prashanthi M, Vijayajyothi D. D. Sharada,. S. Shobha and K. Uma Maheswari (2001)

Effect of Anaemia on Physical Work performance in Post Pubertal Adolescent Girls

The nutritional anthropometry, food and nutrient intake and work performance of post pubertal adolescent girls from schools and Junior College of Rajendranagar Mandal, R. R. District was studied and related to their hemoglobin levels.

Forty five adolescent girls in the age group of 15.0 to 17.9 years were selected and their haemoglobin levels were estimated. Based on their haemoglobin levels, they were grouped into different grades of anaemia as per WHO standards (1968). Anthropometry and body composition of the subjects was taken using standard techniques. Food and nutrient intake of the subjects was assessed using 24 hour dietary recall method. Basal metabolic rate of the subjects was assessed and energy cost of subjects during submaximal exercise test was assessed using Bruce Protocol on treadmill. The results showed that 60 per cent of the subjects were suffering from mild to moderate anaemia. Height and weight of the subjects were significantly lower than NCHS standards. Both anaemic and non-anaemic subjects showed a deficit in intake of iron, vitamin A and protein. The basal metabolic rate and energy cost during submaximal exercise of both anaemic and nonanaemic groups were similar. Even mild and moderately anaemic subjects completed the three loads of submaximal exercise test similar to normals, which may be attributed to the physiological compensatory mechanism and habitual physical activity of the subjects.

N. Kalyani and D. Sharada (1997)

Measurement of the Work Performance of Anemic Adolescent Girls in Andhra Pradesh

Physical work capacity is the ability to perform maximum physical work, and in iron deficiency it is compromised. A suitable field technique (800 meters run) was developed in the Foods and Nutrition department to measure the work performance of anaemic adolescent girls. This technique was used in this study. The work performance of anaemic adolescent girls (11-17 yrs) of two residential schools from Ranga Reddy district, A.P. was measured before and after iron supplementation. The efficacy of the field technique i.e. 800 meters run in comparison with standard step test was established as a tool for measuring work performance.

There were 224 adolescent girls of 11-17 yrs from two residential schools, and all were screened for Haemoglobin by Cyanmeth haemoglobin method. Among them, only 120 girls who had Haemoglobin levels in the range of 8.0 and 9.0 g % were selected for the study. From them, data on nutritional anthropometry, food and nutritional intake and work performance was collected. After deworming, one tablet containing dried ferrous sulphate 200 mg (equivalent to 60 mg of iron) was supplemented daily for 30, 60 and 100 days. Work performance was measured by step test in a sub sample and by 800 meters run in all the subjects after completion of supplementation.

Among these girls the prevalence of anaemia was 69% and a majority of the subjects (40-45 %) were moderately anaemic. Their diets were poorly balanced and did not supply enough nutrients. Iron supplementation for 100 days improved the physical work performance of the subjects as measured by step test and 800 meters run. The study suggested that 800 meters run can be taken as a standard field method for measuring work performance of anaemic girls.

D. Sharada & V. Vimala (1998)

Iron supplementation of Adolescent Girls to Determine the Optimal Period and Regimen for improving Haemoglobin Levels.

Adolescent girls in the age group of 13-15 years numbering 281 from a residential school in

Ranga Reddy district, Andhra Pradesh where screened for anemia. Based on their Haemoglobin levels they were classified as severely anemic (61), moderately anemic (75) and mildly anemic (67) (WHO 1968). Half of the subjects from each grade received a daily supplement (DS) of 60 mg of elemental iron (420 mg/week) while the others were given the supplement weekly twice (120 mg/week) for a period of 84 days. Non anemic subjects (41) who received a placebo served as controls. Hemoglobin and PCV were determined on 0,21,42, 63 and 84 days. Anthropometric data was recorded prior to and after the experiment. Institutional diet survey was carried out three times during the study period to determine food and nutrient intake. Prevalence of anemia among these adolescent girls was 82.9%. Intake of iron was only 49% of RDA. Anthropometric data showed deficiency compared to NCHS and ICMR standards. Both daily and weekly twice supplemented groups showed an increase in haemoglobin levels. The study indicates that the period of supplementation required for resolving anaemia is shorter than 100 days and varied with degree of anaemia, shorter for mild and maximum for severe anaemia. Weekly twice supplementation was as good as daily supplementation with fewer side effects. Hence, an iron supplement to all adolescent girls twice a week for about 100 days in a year is suggested to resolve anaemia and build iron stores in the body.

S. Shobha & D. Sharada (1998)

Development of an Iron rich supplement and its effect on adolescents Haemoglobin status

Iron rich biscuits using commercial defatted Soya flour (10%), Redpalm oil (10%) and Gardencress seeds (5%) were developed and acceptability of these biscuits was assessed using Hedonic scale, by selected panel of Judges. Adolescent boys (119) and girls (95) in the age group of 13 to 15 years from the two local schools in the Rajendranagar Mandal, were screened for hemoglobin levels. From among these, 20 boys and girls each having hemoglobin levels below 10mg/dl were selected. They were supplemented with two biscuits (10gm per day) for a period of 30 days. Supplementation was monitored regularly. Haemoglobin levels were determined after supplementation, and showed an increase of 11%. The study shows that the biscuits developed could be used as iron supplement for adolescents.

K. Swarajya Lakshmi and D. Sharada (2000)

Effect of Lotus (Nelumbo Ucifera Garten) stem incorporated product on Haemoglobin levels of Adolescent Grils

The efficacy of Lotus Stem Powder (LSP) incorporated product as dietary supplement on haemoglobin levels of 18 anaemic adolescent girls in the age range of 17 - 19 years, having haemoglobin (Hb) levels below 12.0 g/dl was studied. Daily supplementation of lotus stem incorporated laddoo to the subjects for a period of 30 days brought about a significant improvement in haemoglobin levels, nutrient intake and slight improvement in anthropometric parameters as compared to the initial value. This suggest that regular consumption of iron rich lotus stem incorporated laddoo along with commonly consumed food could go a long way in preventing anaemia and improving haemoglobin levels in vulnerable population. Moreover, it adds taste and diversity, thus improving the quality and quantity of food intake.

Shakuntala Kumari & K. Krishna Kumari (2002)

Effect of Supplementation of Red Palm Oil, Iron and Vitamin C on Vitamin A and Iron status of Adolescent Girls

A study was conducted to assess the improvement in vitamin A and iron status of adolescent girls on supplementation with Red palm oil, iron and vitamin C. Fifteen volunteers with depleted levels of vitamin A and iron were selected from a school and information regarding general dietary patterns and intake of protective foods was collected. All the subjects were supplemented for 30 days with placebo, 45 days with placebo + iron tablets, 45 days with Deodorised Deacidified Red Palm Oil (DDRPO) laddu + iron tablets, 45 days with DDRPO laddu + iron tablets + vitamin C tablets. At the end of each supplementation period serum retinol, β-carotene and blood haemoglobin were estimated. Maximum haemoglobin was achieved with both vitamin A and iron supplementation rather than with iron supplementation alone and further improved with addition of vitamin C. Vitamin A and β-carotene status improved significantly with DDRPO supplementation. Improvement in vitamin A status may contribute to the control of anaemia in adolescent girls.

K. Aparna & R Manorama (1998)

Effect of malted ready mixes on Iron Nutritional Status of Adolescent Girls

Adolescent girls (104) in the age group of 11-14 years from Zilla Parishad Public High School, Shameerpet were screened and 48 moderately anemic (8-9.9g/dl) girls were selected, to study the effect of an iron supplement on nutritional status. The girls were supplemented for 90 days with 100g of laddoo prepared with wheat mix and soy malt incorporated at 25%, which contributed protein 12.3 g, energy 430.5 kcal and 6.4mg of iron. Hemoglobin levels were estimated at 30, 60 and 90 days of supplementation. Data on general information of the families, frequency of foods consumed, food and nutrient intake, health status, socio-economic factors of adolescent girls were also collected.

The results of the study revealed that the germination of soybean significantly increased protein content and doubled total and available iron content. In cereals it brought an improvement in the protein content by (25%). Ready mixes prepared with cereal and soy malts in (3:1) showed significant improvement in all the nutrients.

The dietary data of adolescent girls, showed that their intake of cereals was meeting the RDA. Consumption of milk and milk products and leafy vegetable was very poor. Due to supplementation a significant improvement in all the nutrients was seen. The intake of iron was above 52 per cent of RNI during supplementation. Positive correlation was seen between hemoglobin levels, anthropometric measures and duration of supplementation. Anthropometric measurements were below the standard values and majority were having iron deficiency. The supplement has resulted in significant improvement in weight and 25 percent of increase in mean hemoglobin levels.

K. Anila and D. Sharada (2003)

Energy cost of sports events and effect of Iron supplementation in Adolescents

While iron deficiency anemia limits athletic performance, endurance athletes are at risk of becoming anemic as atheletic activities provoke losses of body iron. Sixty adolescent girls from A. P. Sports school were first screened for hemoglobin levels. Nutritional status was assessed by anthropometry and diet survey. VO_2 max was measured and the energy cost of the sports events estimated using Benedicts Roth apparatus and Servo max oxygen analyzer.

Anthropometry showed that the girls were in grade I malnutrition though BMI was normal. Diet survey showed consumption of all nutrients to be normal except iron which was deficient by 54%. Hemoglobin levels showed presence of anemia. VO_2 max of the subjects was lower than that of international level atheletes.

The subjects were supplemented with 60mg. of elemental iron for 2 months which improved the haemoglobin status of the subjects as well VO_2 max.

Thus iron supplementation proved beneficial for athletes who were anemic. The physical performance of the athletes improved with improvement in the iron status and in turn decreased the energy cost of sports events.

M. Nagalakshmi & V. Vijayalakshmi (2000)

Iron Nutritional Status of Chenchu adolescent Girls in Kurnool District

An attempt was made to study the iron nutritional status of tribal adolescent girls and its relationship with intellectual performance in two residential schools of Kurnool district. Sixty six adolescent girls in the age group of 11 to 13 years were selected from the schools, based on their haemoglobin level (<12.0 gm/dl). Anthropometric assessment was carried out. Food and nutrient intake was assessed by institutional diet survey and 24 hour recall method. Intellectual abilities of the subjects was assessed by using Ravenís SPM test.

The results showed that a majority of the subjects were moderately anaemic followed by mild and severe cases. Height and weight of the subjects were significantly lower than the NCHS standards. The subjects showed a deficit in the intake of iron, followed by carotene, protein, fat, and vitamin C. Poor intellectual performance of majority of the subjects may be due to the observed iron deficiency anaemia. The results suggest that there is a need for improvement of nutritional status and intellectual stimulation through health and nutrition education.

K. Sudheshna & D. Sharada (2000)

Health and Nutritional Status of Women and Adolescent Girls Working in Beedi Factories of Karimnagar District

In a study 44 adolescent girls were selected from two beedi factories from Metpally and Korutla

of Karimnagar District. Information on socio economic background, food expenditure pattern, anthropometric measurements, clinical signs and symptoms, morbidity and pattern of food and nutrient intake was collected.

The results of anthropometric measurements revealed that though the heights of adolescent girls of both the factories were nearer to NCHS standards, weights of adolescent girls were not on par with NCHS standards. Among various nutritional deficiencies symptoms, anaemia was more prevalent among women and adolescent girls than riboflavin deficiency. Personal hygiene of the respondents was poor. Most of the respondents had dull / pale hair, brownish teeth and scaly or rough skin. A positive correlation was observed between haemoglobin levels and nutritional status among the adolescent girls. Thus, it can be inferred from results that beedi making had a strong negative impact on health and nutritional status of adolescent girls and women.

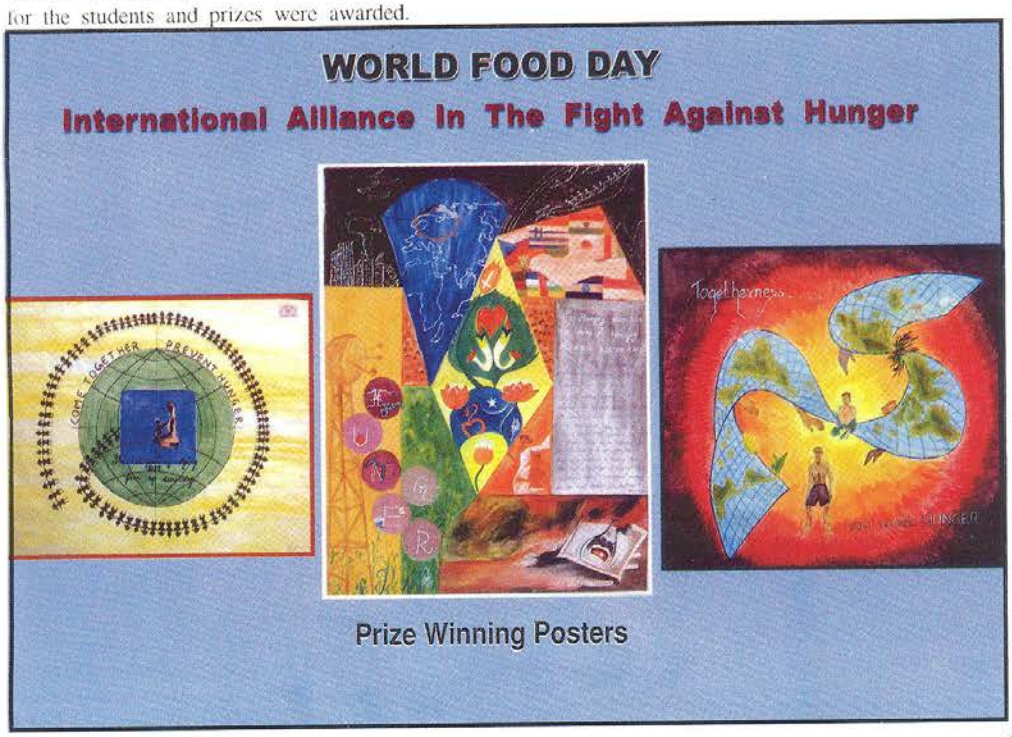
K. Manasa & K. Aruna (2002)

World Food Day Celebrations

World Food Day was celebrated on 16th October 2003 by the Department of Foods and Nutrition, College of Home Science, Hyderabad by organizing various activities to enhance nutrition knowledge and awareness of college and school students.

A poster competition was held at College of Home Science on the theme of World Food Day - 'International Alliance in the fight against hunger' for B.H.Sc., M.Sc. (Foods and Nutrition) and M.Sc. (Food Science & Technology) students.

The Zilla Parishad High School at Sivarampalli with a strength of twelve hundred students was selected and a meeting was arranged to explain about World Food Day, its theme, food and nutrition security and the role of children in transferring the knowledge to their parents. An exhibition on adolescent nutrition was put up which attracted a lot of interest from the students. A quiz competition was organized for the students and prizes were awarded.



Prize Winning Posters

WORLD DIABETES DAY CELEBRATIONS

World Diabetes Day was celebrated on 14th November 2003 at College of Home Science, ANGR Agricultural University with a theme 'Diabetes & Kidney Complications' and the slogan 'Diabetes could cost you your kidney - Act now'. Dr. P. Shyam Sundar, a renowned Diabetologist and Dr. K. Swarajya Lakshmi, Superintendent, Government Maternity Hospital, Sultan Bazaar, Hyderabad enlightened the gathering on diabetes, its consequences and control. Dr (Mrs) Vijaya Khader, Dean of Home Science, in her presidential address further emphasized the need of Diabetes Management. An interactive session was conducted by Dr. D. Sharada, where the doubts raised by the participants were cleared by the expert committee. A diabetic diet exhibition and nutrition counseling were also held during the day's programme.

ANNOUNCEMENT

A training programme entitled *Community Nutrition-Newer Challenges and Approaches* will be conducted during June 2004 by the Centre of Advanced Studies, in Foods & Nutrition, NGR Agriculture University, Hyderabad. TA, Boarding & Lodging expenses of SAU staff will be met by the organizers. Nominations may be sent to :

The Director,
Centre of Advanced Studies,
Post Graduate & Research Centre,
ANGR Agril. University,
Rajendranagar, Hyderabad - 500 030.

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