



Nutrient Intake Amongst Adolescent Girls Residing in An Urban Slum of Delhi

KEYWORDS

Anaemia, adolescent girls, dietary intake, micronutrient

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ABSTRACT Anaemia is a severe public health problem in India. Dietary diversification is one of the most important long term strategy for combating anaemia. The present study was therefore undertaken to assess the nutrient intake of anaemic adolescent girls residing in an urban slum of Delhi. Information on nutrient intake was collected using 24-hour dietary recall and food frequency questionnaire. Mean nutrient intake was compared with Recommended Dietary Allowances for Indians. The mean calorie consumption was 1392±238 Kcal/d, 1654±254 Kcal/d and 1649±288 Kcal/d for Group I (11-12 yrs), II (13-15 yrs) and III (16-18 yrs) respectively. 78.3% of the subjects were found to consume less than 50% of the recommended allowance for iron. Adequacy for other hematopoietic nutrients mainly folic acid and vitamin B12 was around 70-80%. The present study indicated low intake of nutrients especially iron. Creating community awareness through massive campaigns focussing on educating people about anaemia is important.

INTRODUCTION

Adolescence has been reported and proven as one of the most vulnerable phase in the path of human life cycle after infancy, characterized by rapid growth and development. Adolescents, especially adolescent girls, at this stage needs protein, iron and other micronutrients to support the adolescent growth spurt and to meet the body's increased demand for iron during menstruation (WHO, 2002). The main nutritional problems identified in adolescents are micronutrient deficiencies in general and iron deficiency anaemia in particular. As per the 12th Plan document of Planning Commission, Government of India, it is envisaged to prevent and reduce prevalence of anaemia among women aged 15-49 years to 28 per cent by the end of the plan period (12th Five Year Plan, Planning Commission). Though iron folic acid supplementation is the recommended and effective method of reducing anaemia, food based strategies like dietary diversification and food fortification are important measures as a long term strategy for prevention of any nutritional deficiency. Hence, it is imperative to assess the dietary intake of anaemic adolescent girls so that intervention module emphasizing on lifestyle and dietary modifications can be developed.

Adolescent girls residing in slums are more likely to suffer from nutritional deficiencies because of co-existence of insufficient incomes with poor coverage of basic amenities and health services. The present study was therefore undertaken to assess the nutrient intake of anaemic adolescent girls (11-18 years) residing in an urban slum of Delhi and to compare it with Recommended Dietary Allowance (RDA) for Indians, as laid down by Indian Council of Medical Research, 2010.

MATERIAL AND METHODS

The study was carried out in Kirti Nagar slums of West Delhi, which is a notified slum colony as per 'Delhi Urban Shelter Improvement Board' under Government of NCT of Delhi with a total population of approx. 60,000. Door-

to-door survey to identify adolescent girls was carried out in 6 out of the 10 major blocks of Kirti Nagar slums. Mild (100-119 g/L) or Moderately (70-99 g/L) anaemic, unmarried non-pregnant adolescent girls, whose parents gave written consent, were enrolled for the study. The data presented in this article is a part of data collected under a larger study to assess the impact of iron, folic acid and vitamin B12 supplementation among anaemic adolescent girls (CTRI/2011/12/002217).

Dietary intake of nutrients was assessed using 24-hour recall method (Thimmayamma BVS, 1987) and Food Frequency Questionnaire among 400 mild or moderate anaemic adolescent girls. The data was analyzed for the mean consumption level of various nutrients using 'Dietsoft' software based on Nutritive Value of Indian Foods (Gopalan et al, 2004). The value thus obtained was assessed for adequacy by comparing with respective RDA (ICMR, 2010). Ethics committee clearance was obtained from Lady Irwin College, University of Delhi prior to initiation of the work.

RESULTS

The mean age of the subjects was 13.5±1.9 yrs. The mean weight, height and BMI were 35.7±7.2 Kgs, 142.7±6.2 cms and 17.4±2.9 Kg/m² respectively (Table 1).

Table 1: Anthropometric status of the subjects

Anthropometric Indices	Number of subjects (n=400)		
	Mean±SD	Range	95%CI
Weight (Kg)	35.7±7.2	20.6-63.1	35.0-36.4
Height (cm)	142.7±6.2	121.2-158.9	142.1-143.4
BMI (Kg/m ²)	17.4±2.9	11.3-29.5	17.2-17.7
MUAC (cm)	21.5±2.0	16.4-30.4	21.3-21.7
Waist Circumference (cm)	61.4±5.6	47.9-86.1	60.8-62.0
Hip Circumference (cm)	75.8±6.9	55.3-98.4	75.1-76.6

When compared to WHO Child Growth Standards, 2007, a total of 26.5% subjects had BMI <5th percentile, indicating of undernutrition and a meager 2.7% had BMI >85th percentile, indicating obesity.

For the evaluation of dietary intake, participants were categorized into three groups: 11-12 yrs (Group I), 13-15 yrs (Group II) and 16-18 yrs (Group III). The nutrient intake was compared to Recommended Dietary Allowance (RDA), Indian Council of Medical Research, 2010 (Table 2). The mean calorie consumption per day was 1392±238 Kcal, 1654±254 Kcal and 1649±288 Kcal for Group I, II and III respectively with an approx. 70% adequacy w.r.t. RDA. The mean protein intake per day in Groups I, II and III was 37.9±6.6 g, 45.2±7.0 g and 45.5±7.9 g respectively,

as against the RDA of 40.4 g, 51.9 g and 55.5 g, indicating percent adequacy in the range of 82% to 93.8%. Mean daily intake of iron was least when compared to RDA with 78.3% of the subjects not consuming even 50% of the recommended allowance and 98.3% subjects consuming less than 75% of RDA. Adequacy for other hematopoietic nutrients mainly folic acid and vitamin B12 (taking 0.5 µg/d as the RDA) was around 70-80%, whereas, the intake of ascorbic acid, which is a well known iron absorber enhancer was found to be more than 100% in all the three groups.

The nutrient intake for all nutrients like iron, vitamin A, vitamin C etc was found to be independent of the severity of anaemia, i.e. mild vs moderate (p<0.05).

Table 2: Mean nutrient intake of the subjects

Nutrients	Age of the subjects									Subjects consuming <50% of RDA	Subjects consuming <75% of RDA
	Group I [11-12 years (n=154)]			Group II [13-15 years (n=166)]			Group III [16-18 years (n=80)]				
	Mean±SD	RDA	% Adequacy w.r.t. RDA	Mean±SD	RDA	% Adequacy w.r.t. RDA	Mean±SD	RDA	% Adequacy w.r.t. RDA		
Energy (Kcal/d)	1392±238	2010	69.3	1654±254	2330	71.0	1649±288	2440	67.6	4.0	70.5
Protein (g/d)	37.9±6.6	40.4	93.8	45.2±7.0	51.9	87.1	45.5±7.9	55.5	82.0	0.3	20.75
Calcium (mg/d)	535±168.7	800	66.9	636±209.1	800	79.5	617±193.2	800	77.1	12.5	57
Iron (mg/d)	9.9±2.8	27	36.7	12.3±4.4	27	45.6	12.1±3.3	26	46.5	78.3	98.5
Vitamin A (µg/d)	522±551	600	87.0	611±696	600	101.8	564±635	600	94.0	48.8	65
Ascorbic Acid (mg/d)	63.4±17.8	40	158.5	82.5±35.6	40	206.3	64.4±74.2	40	161.0	11.5	33.5
Folic Acid (µg/d)	109.3±54.9	140	78.1	134.0±76.7	150	89.3	138.7±74.7	200	69.4	20.5	56
Vitamin B12 (µg/d)	0.32±0.32	0.2-1.0	-	0.35±0.32	0.2-1.0	-	0.42±0.43	0.2-1.0	-	-	-

***18% of the subjects had vitamin B12 consumption of <0.2 µg/d**

DISCUSSION

In India, various Nutrition surveys are being carried out to assess the dietary adequacy amongst different age-groups in the country.

Rao et al, 2010 undertook analysis of data collected during 1998-99 and 2005-06 under National Nutrition Monitoring Bureau (NNMB) on diet and nutritional status of tribal and rural population in eight States of India, viz., Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil and reported that the mean intake of cereals and millets was 402 g and 365 g respectively in tribal and rural non pregnant non lactating (NPNL) women, against the RDI of 410 g. The intake for all nutrients was found to be less than the RDA, the deficit being more with respect to micronutrients such as iron, vitamin A, riboflavin and free folic acid.

The India Nutrition Profile, 1998 under Food & Nutrition Bureau in the Department of Women & Child Development carried out a survey in 1995-96 to obtain nutrition profile in 18 States and Union Territories covering 187 districts reported that carbohydrates remain the major source of energy in the Indian diet. Amongst adolescents, consumption of iron was found to vary between 50-60% of the RDA; whereas vitamin C intake was found to be higher

than the RDA. The percent adequacy of vitamin A was found to be around 50-60% of the RDA.

The National Sample Survey Organization (NSSO), 2007 collected information on the consumption of proximate principles, i.e. namely calorie, protein and fat from all the states and Union Territories in the country. Data was collected from a sample of 79,298 rural and 45,346 urban households spread over 7,999 villages and 4,602 urban blocks respectively. It was reported that out of the total calorie intake, more than 67% of the calorie intake in rural areas and 56% in urban areas was derived from cereals alone. It was found that the average daily intake of protein by the Indian population had decreased from 60.2 grams to 57 grams in rural areas between 1993-94 and 2004-05, and remained stable around 57 grams in urban areas during the same period. A significant rise in per capita daily average intake of fat was observed during the decade (1993-94 to 2004-05) in both rural and urban areas.

Another study to assess the diet quality and nutritional status of beneficiaries of Adolescent Girl scheme, a national programme targeted towards nutrition/health needs on 209 girls (aged 11-21 years) from six rural blocks of Delhi, Haryana, Rajasthan, and Uttar Pradesh indicated that 49.3% of the subjects were found to have energy intake

less than 75% of RDA while a substantial proportion of them had inadequate nutrient intake (NAR <0.66) with respect to most of the micronutrients especially iron (84.7%), folic acid (79.4%) and vitamin A (73.2%) (Malhotra and Passi, 2007). Similarly, in a study carried out among school going post-pubescent girls (n=208) from Namakkal district of Tamil Nadu, reported mean calorie intake as 1905 Kcal/day against the RDA of 2060 Kcal. The percent adequacy for protein and calcium ranged between 80-90%; whereas for iron percent adequacy varied between 60-65%. Other studies among adolescent girls in the country have also reported lower consumption of most of the micronutrients especially iron w.r.t. RDA with carbohydrates being the main source of energy (Parimalavalli & Sangeetha, 2011; Maliye et al, 2010; Sharma et al, 2005; Saibaba et al, 2002; Tatia and Taneja, 2003).

Anaemia is a multifactorial problem and has far reaching impact on the national productivity and development. Inadequate nutrient intake due to poor bioavailability of iron from food, poor purchasing power, low level of literacy/ awareness; infections and malnutrition are some of the main etiological factors. Creating community awareness through massive campaigns focussing on educating people about anaemia is important. Further, promoting potential dietary sources that contain high quantities of ascorbic acid, animal products and iron absorption enhancers including many leafy vegetables and legumes among the agents of social change, i.e. Anganwadi workers, ANM, paramedicals etc at community level and school teachers at school level is important. The change may be slow but can be well achieved. Educating people will help them in making wiser food choices and would also improve the compliance of IFA tablets.

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