

Assessment of dietary micronutrient deficiency among adolescent girls

JYOTI TAK AND NIKITA WADHAWAN

Micronutrients such as vitamins and minerals play an important role in the promotion of health and prevention of disease. Adolescents are considered to be nutritionally vulnerable segment of the population. The present research study aims to assess the micronutrient deficiency in the diet of adolescent girls. For this purpose, 120 school going adolescent girls in the age range of 13-18 years were selected from the Udaipur city of Rajasthan. The 24-hours dietary recall method was used to collect the data. The dietary micronutrient pattern of the selected girls illustrated deficiency of calcium, iron, zinc, riboflavin, niacin and dietary folate. Moreover, an intake of thiamine and ascorbic acid was meeting 50 per cent to RDA, which was far better than the other micronutrients intake. The findings of the study indicated that more targeted interventions are needed and nutrition education is required to overcome the risk of micronutrient deficiency among adolescent girls.

Key Words : Micronutrient deficiency, Micronutrient intake, Consumption pattern adolescent girls

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INTRODUCTION

World Health Organization (WHO) has defined 'adolescence' as the period between 10 and 19 years. Adolescent girls, constituting nearly one tenth of Indian population, form a crucial segment of the society (Malhotra and Jain, 2007). Unfortunately adolescent girls are a neglected sector of the population of our country. Early adolescence after the first year of life is the second critical period of rapid physical growth and changes in body composition, physiology and endocrinology. Such remarkable physical growth and development

significantly increases the needs of micronutrients (Bezabih, 2009).

Micronutrients such as vitamins and minerals play an important role in the promotion of health and prevention of disease (Mai *et al.*, 2003). Besides deficiency of calories and protein, deficiency of micronutrients (vitamins and minerals) is rampant. Micronutrient deficiency largely goes unnoticed by the general public, by many decision makers and even by the affected individuals themselves (Patil *et al.*, 2009). This is why this form of malnutrition is also called 'hidden hunger' (Stein, 2006). Micronutrient deficiency is mainly caused by lack of balanced diet. While often providing enough calories, monotonous diets based on cereals and other starchy staple foods frequently fail to deliver the sufficient quantities of essential minerals and vitamins (Hettiarachchi *et al.*, 2006). The 1987-1988 USDA's Nationwide Food Consumption Survey identified iron, vitamins A and E, calcium, magnesium

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and zinc as nutrients of concern for all adolescents. Ensuring adequate nutrition for adolescents could provide an opportunity for healthy transition from childhood to adulthood and could break the vicious cycle of intergenerational malnutrition (Vereecken *et al.*, 2005). Deficiencies are thus typically associated with certain dietary patterns. Understanding these patterns can provide important information about the relationship between food consumption and the risk of micronutrient malnutrition. Therefore, serious attention is needed to study micronutrient intake during adolescence.

METHODOLOGY

Selection of samples:

The study was conducted in Udaipur city of Rajasthan in the duration of August 2014 to December 2015 with a sample of 120 adolescent girls between the age group of 13-18 years who were attending school regularly. The sample was drawn from four government schools (from four zones of Udaipur city). Thirty adolescent girls from each school were selected on the basis of their willingness to participate in the research endeavor.

Development of tool:

Keeping in mind the objectives of the study, questionnaire method was used for data collection. A tool was developed and pretested to collect the information pertaining to back ground information and health attributes of the respondents like; habits of exercise, menstrual cycle, suffering from or any kind of illness, any major problem of health, if they have participated in any supplement feeding programme and if they ever received any supplements of vitamins, minerals.

Micronutrient adequacy in diet:

Micronutrient intake of subjects was calculated by using 24- hour dietary recall method for one day. Type of food consumed was assessed and quantity of raw food was reported in grams. Nutrient intake was calculated using food composition tables (Gopalan *et al.*, 1989). Mean nutrient intake for one day was compared with recommended dietary allowances (NIN-2010) and per cent adequacy was calculated as follows:

$$\text{Per cent adequacy of nutrient intake} = \frac{\text{Nutrient intake}}{\text{Recommended dietary allowances}} \times 100$$

Analysis of data:

After collecting data, it is necessary to analyze it with the help of statistics to arrive at proper and adequate conclusion (Gupta, 2012). Frequency, percentage distribution, mean, standard deviation, standard error and test were calculated for analysis of the data.

OBSERVATIONS AND ASSESSMENT

Major findings of the study revealed that majority respondents were belonging to Hindu family, had joint family and low socio-economic status. Information regarding health attributes indicated that only 23.33 per cent were performing exercise out of 120 respondents. About 28.44 per cent were having irregular menstrual cycle. About 35.83 per cent of respondents were having regular head ache and twenty per cent respondents were having regular problem of pain in legs.

Findings indicate that majority of the respondents (62.5%) were vegetarians and rest of them were non vegetarians and ovo-vegetarians (Fig. 1). The maximum of respondents were following two meal pattern. Nearly 66.66 per cent of the respondents participated in supplementary feeding programme at school and out of them 95.0 per cent did receive iron supplement tablets.

Data related to micro nutrients intake reveals that the mean intake of calcium was significantly ($p < 0.01$) lower than RDA in all age groups. Similarly Khadikar *et al.* (2007) found in their study that the median dietary intake of calcium by the Pune girls was 449 (356-538), mg/d, which was lower than the recommended intake. Iron intake was 36.08 per cent, 37.15 per cent and 45.82 per cent of RDA in age group of 13-15, 16-17 and 18 years. A study conducted by Toteja *et al.* (2006) reported that overall prevalence of anemia in adolescent girls (defined as hemoglobin < 120 g/lit.) was 90.1 per cent, with 7.1 per cent having severe anemia (hemoglobin < 70 g/lit.) in 16 districts of India (Fig. 2).

The mean intake of zinc was 38.25 per cent for adolescents in the age group of 13-15 years and it was found to be 36.39 per cent and 46.44 per cent of RDA in age group of 16-17 years and 18 years, respectively. The mean intake of carotene in age group of 13-15 years and 16-17 years was 1077.05 ± 1243.06 $\mu\text{g/d}$ and 1394.68 ± 1807.09 $\mu\text{g/d}$. It was 22.43 per cent and 29.05 per cent of RDA. The intake of riboflavin in age group of 13-15 years was 32.13 per cent of RDA while in the age group of 16-17 and 18 years, intake of riboflavin was 44.13 per

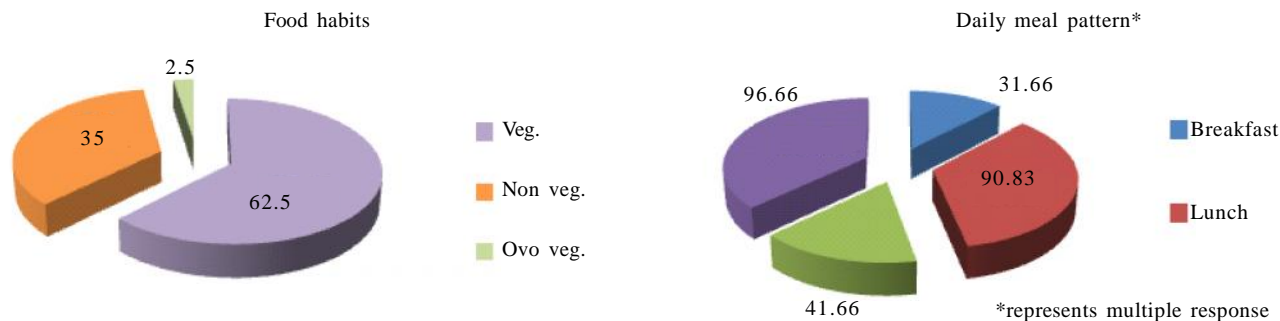


Fig. 1 : Distribution of respondents on the basis of their eating habits

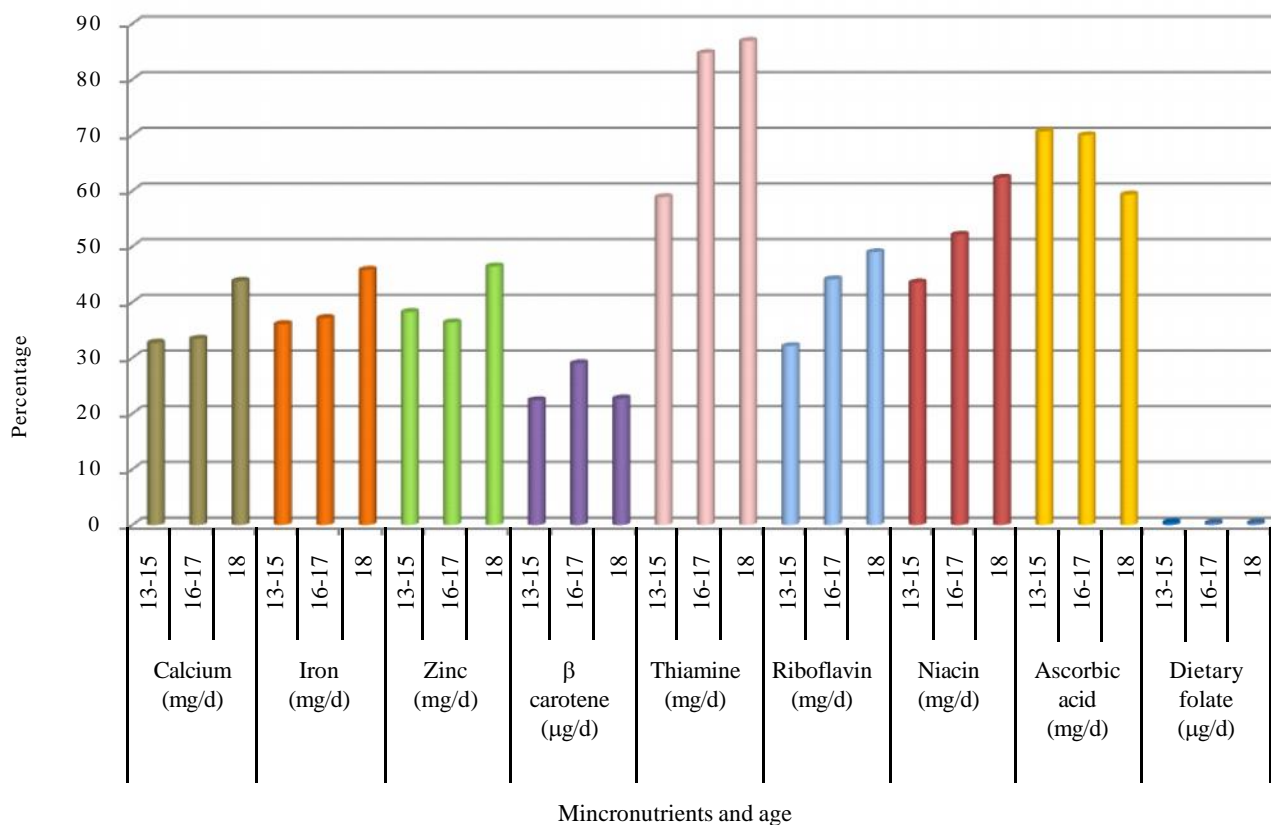


Fig. 2 : Per cent adequacy of micronutrients intake by adolescent girls

cent and 49.01 per cent of RDA, respectively. Intake of dietary folate was found to be lowest (0.48 % and 0.44 %) for adolescent girls in the age group of 13-15 years and 18 years. Further, the intake of thiamine and ascorbic acid was also found to be lower than RDA but intake of these micronutrients was quite better than the other micronutrient intake.

Similarly Monge (2001) reported in his study that the micronutrients most at risk for inadequate intake were zinc, calcium, and folate: more than 25 per cent of the

adolescents did not meet 50 per cent of RDA indications for these micronutrients.

Conclusion :

The present investigation illustrates that most adolescent girls failed to meet dietary intake recommendations in all the food groups. In addition, most of these girls failed to have adequate consumption of important micronutrient rich foods. This is most likely due to the illiteracy of the mothers of the adolescent girls

belonging to low socio-economic status. Adolescent girls often skip meal on regular basis and follow two meal patterns. This research study suggests that energy-dense, nutrient-rich foods such as meats and dairy products, as well as less energy-dense, nutrient-rich foods such as fruits and vegetables make important contributions to micronutrient adequacy during critical adolescent periods.

From the findings of the present study it can be concluded that, even after the efforts of the government health and nutritional programmes the micronutrient intake in diet of adolescent girls was found to be very low. This probably puts the community at a greater risk as these adolescent girls will become future mothers and would definitely reflect on the health of their children. Interventions for the prevention and control of micronutrient malnutrition typically have focused on pregnant women and young children, however, there is increasing evidence that micronutrient malnutrition is also prevalent in adolescent girls. Appropriately target interventions, and monitor and evaluate progress in our efforts to prevent and control these deficiencies are needed. Given the importance of proper nutrition in this age group and its impact on future health of society, it appears that more nutritional education and facilities should be provided for proper nutritional performance for students.

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