

Impact of nutrition education on iron deficiency anaemia among college student of Banasthali University, Rajasthan

JYOTI KUMARI AND RITU PRAKASH DUBEY

Malnutrition encompasses a broad spectrum of deficiencies, of which the most devastating is the deficiency of one or more of the three micronutrients namely iron, vitamin A and iodine. Anemia is a condition where oxygen carrying capacity of the blood is reduced due to reduced hemoglobin concentration in the blood. Among adolescent girls, constitute a vulnerable group, particularly in developing countries due to poverty, inadequate diet, certain disease, pregnancy / lactation and poor access to health service. Nutrition education is an instructional method that promotes healthy behaviors by imparting information that individual can use to make informed decision about food, dietary habit and health. A recent study has shown the impact of Nutrition Education on the nutritional knowledge of adolescent girls. The objective was to study the prevalence of anemia among adolescent girls and to assess the dietary awareness and dietary practices of adolescent girls. Sixty girls were selected by random Sampling. The knowledge level and Practice level pre-questionnaire was prepared to collect background information on the subjects. A dietary assessment was an essential part and was done by an oral questionnaire (24 hours dietary recall). The subjects were introduced to nutrition and anemia after filling in the questionnaire. They used educational materials such as posters, charts, pamphlets, models, flash cards and leaflets. The same structured questionnaire was used to test nutritional knowledge level after the educational program. A significant difference ($P>0.005$) was observed in the score of pre and post test of Nutrition Education intervention. Hence Nutrition Education is an appropriate, effective and sustainable approach to combat iron deficiency anemia.

Key Words : Anemia, Nutrition education, 24 hours dietary recall

How to cite this article : Kumari, Jyoti and Dubey, Ritu Prakash (2016). Impact of nutrition education on iron deficiency anaemia among college student of Banasthali University, Rajasthan. *Food Sci. Res. J.*, 7(1): 74-79.

INTRODUCTION

The problem of malnutrition encompasses a broad

MEMBERS OF RESEARCH FORUM

Author for correspondence :

JYOTI KUMARI, Department of Food and Nutrition, Ethelind School of Home Science, Sam Higginbottom Institute of Agriculture, Technology and Sciences, ALLAHABAD (U.P.) INDIA
Email : jyoti.kumari383@gmail.com

Associate Authors' :

RITU PRAKASH DUBEY, Department of Food and Nutrition, Ethelind School of Home Science, Sam Higginbottom Institute of Agriculture, Technology and Sciences, ALLAHABAD (U.P.) INDIA
Email : ritupdubey2009@rediffmail.com

spectrum of deficiencies, of which the most devastating is the deficiency of one or more of the three micronutrients namely iron, vitamin A and iodine. Nutritional or iron deficiency anemia (IDA) is a pathological condition in which the level of hemoglobin in the blood, the haemalocrit or the number of red blood cells (RBC) becomes abnormally low. India has the highest prevalence of iron deficiency anemia in the world. (Kindu and Tupe, 2003). Anemia is a condition where oxygen carrying capacity of the blood is reduced due to reduced hemoglobin concentration in the blood. Normal

hemoglobin (Hb) level is 14.5 to 16.5 g/dl and 12 to 14.5 g/dl for male and female, respectively (Islam *et al.*, 2001). Iron deficiency is ranked at the top one three global “hidden hungers” with about one fifth of the world population suffering from iron deficiency anemia (Maphill and Bothwell, 1992).

National Family Health Survey (NFHS-3 2007) reveals the prevalence of anemia to be 70-80 per cent in children, 70 per cent in pregnant women and 24 per cent in adult man. The main reason for the high prevalence of anemia in India is dietary inadequacy (Vijayaraghavan, 2007). Prevalence of anemia in India is high because of low dietary intake, poor availability of iron and chronic blood loss due to hook worm infestation and malaria (NFHS-3, 2007). Among adolescent girls, constitute a vulnerable group, particularly in developing countries due to poverty, inadequate diet, certain disease, pregnancy / lactation and poor access to health service. The nutritional anemia in this group attribute to high MMR, high incidence of LBW babies, high prenatal mortality and fetal wastage and consequent high fertility rate (WHO, 2000).

Intervention strategies for addressing anemia include the short to medium term approach of iron supplementation for vulnerable group such as growing children and adolescents. Medium to long term effective approaches for addressing iron deficiency include food fortification, dietary modification and public health and disease control measure such as improved sanitation, prenatal and antenatal care (Gopaldas, 1996). Nutrition education is an instructional method that promotes healthy behaviors by imparting information that individual can use to make informed decision about food, dietary habit and health (Moore *et al.*, 2009). Hence, this study has been focused on an impact of nutrition education of adolescent girls with following objectives.

- To assess the prevalence of anemia among adolescent girls.
- To assess the dietary knowledge of adolescent girl.
- To assess the dietary practices of adolescent girl.
- To impart nutrition education.
- To give suggestion and recommendation to improve nutritional status and reduction in anemia.

METHODOLOGY

Selection of the subjects :

The study was conducted on college girls of

Banasthali University, Rajasthan. The 60 sample of girls were selected by purposive sampling.

Preparation of questionnaire :

Questionnaire is structured set of question usually sent by mail or provided by hand. As per to detect the knowledge level and practices questionnaire was prepared as well as it collected the background information of the subjects. All information to collect into Hindi for the suitability of understanding.

Proforma for background information :

The background information including age, food habits *i.e.* lacto vegetarian, lacto OVO vegetarian, non vegetarian, date of birth, of the subjects to make the generalization of the subjects.

Questionnaire for practices :

A questionnaire was made to obtain information about their food habits, dietary practices and consumption pattern. This questionnaire was a set of 10 questions with two options ‘Yes’ or ‘No’.

Questionnaire for knowledge :

Prior to imparting education, the extend of the knowledge should be checked. For this purpose the tool was developed in this manner. A questionnaire was prepared to assess their knowledge about anemia and iron deficiency.

A final questionnaire was formulated contain a set of 15 question with 4 option, the answer to which was provided by the subject by the subject by tick the option which seems suitable to them.

Dietary assessment :

Dietary assessment being an essential part of the surgery was assessed by an oral questionnaire (24 hours dietary recall) in which the subject were asked about the intake of each food item by using the standardization of cups to have the specificity of the amount.

Calculation of nutrient intake :

The calculation of nutrients intake of food intake of the subjects were undertaker with the help of nutrient division enlisted by ICMR book of nutritive value.

Calculation of energy and other macronutrients and micronutrients like vitamin-C and iron was done and

compared with RDA reference and difference to mark the deficiency percentage.

Scoring and data analysis :

Scoring was done on the basis of marks criteria *i.e.* ‘0’ for each wrong answer and ‘1’ for each right answer. Then total was obtained out of 10 for practice questionnaire and out of 15 for knowledge based questionnaire, then percentage was obtained.

After words, the data was recorded in tabulation sheets to interpret the frequency distribution, mean, median range and mean standard deviation for food habit, age and dietary intake.

Statistical analysis :

Mean :

Mean are, the central part of the distribution. It is extensively used in practical work. The most popular and widely used measure of representing the entire data by one value is mean.

Formula :

$$\bar{X} = \frac{\sum X}{N}$$

Standard deviation :

Standard deviation is the most important and commonly used measure of dispersion. It measures the absolute dispersion or variability of a distribution. A small standard deviation means a high degree of uniformity in the observation as well as homogeneity of the series.

Standard deviation is the positive square root of the average of square deviation taken from the arithmetic mean. It is also known as root mean square deviation.

Formula :

$$SD = \sqrt{\frac{\sum (X - \bar{X})^2}{N}}$$

Student’s t test: Theoretical work on t- distribution was done by W.S. gusset (1876-1937) .Thereafter, the t-distribution is commonly called students t- distribution or simply student’s distribution. Student’s distribution is generally used to test significance of various results obtained from small samples.

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{S} \times \sqrt{\frac{n_1 \times n_2}{n_1 + n_2}}$$

Development of tools or aids for the enhancement of nutrition education among the subjects :

As the subjects were introduced to the nutrition and anemia after the filling of questionnaire, they were right to be educated via tools of nutrition education.

Along with the following tools such as:

- Poster
- Pamphlet and folder
- Flash chart
- Chart
- Model
- Leaflet

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads and in Table 1 to 13.

Background information of subjects :

Table 1 : Background information of subjects

1.	Total no. of subjects (n)	60	
2.	Age (years)		
	Mean ± SD	18±0.86	
	Median	18.0	
3.	Food habits, no (%)		
	Lacto vegetarian	37	(62%)
	Lacto OVO vegetarian	16	(27%)
	Non vegetarian	7	(12%)

Nutrition knowledge and practice assessment (Pre intervention) :

Table 2 : Number of correct responses for knowledge based questions

Knowledge related questions	Correct answer	
	(n=60)	(%)
1	58	97.00%
2	46	77.00%
3	15	25.00%
4	49	82.00%
5	49	82.00%
6	45	75.00%
7	53	88.00%
8	52	87.00%
9	34	57.00%
10	30	50.00%
11	24	40.00%
12	21	35.00%
13	26	43.00%
14	31	52.00%
15	46	77.00%

Table 3 : Number of respondents following healthy practices

Practices questions	Subjects with healthy practices	
	(n=60)	(%)
1	42	70.00%
2	44	73.00%
3	28	47.00%
4	21	35.00%
5	14	23.00%
6	46	77.00%
7	29	48.00%
8	47	78.00%
9	21	35.00%
10	34	57.00%

Table 4 : Knowledge and practices scores of the subject

Score of	Mean ± SD
Knowledge* 5 marks	9.4 ± 2.32
Practices** 10 marks	5.5 ± 1.65

* maximum possible score 15 **maximum possible score 10

Dietary assessment :

Dietary assessment of individual or group helps in identifying their dietary deficient on excessive intake. Dietary assessment study reflects the current on recent nutrient intake.

Dietary intake pattern of the subject was assessed by 24 hour dietary recall (Table 5).

Table 5 : Energy and nutrients intake by the subjects

Nutrients	RDA	Actual intake Mean ± SD
Energy (kcal)	1875	1376.3±476.33
Protein (g)	50	41.6±25.52
Iron (mg)	30	12.8±11.40
Vitamin (mg)	40	27.6±20.54

Impact of nutrition education programme post intervention stage :

Table 6 : Number of correct responses for knowledge based question –post intervention

Knowledge related questions	Correct answers	
	(n=60)	(%)
1	60	100.00%
2	44	73.00%
3	18	30.00%
4	42	70.00%
5	46	76.00%
6	47	78.00%
7	52	86.00%
8	22	36.00%
9	22	36.00%
10	45	75.00%
11	49	81.00%
12	55	91.00%
13	33	55.00%
14	45	75.00%
15	20	33.00%

Table 7 : Number of respondents following healthy practices- post intervention

Dietary practices questions	Correct response answers	
	(n=60)	(%)
1	23	38.00%
2	49	81.00%
3	37	61.00%
4	27	45.00%
5	33	55.00%
6	49	81.00%
7	47	78.00%
8	39	65.00%
9	23	38.00%
10	36	60.00%

Table 8 : Number of correct responses for knowledge based questionnaire at pre and post intervention stages

Question number	Number of correct response N (%)							
	Pre intervention				Post intervention			
	Experimental		Control		Experimental		Control	
	No.	%	No.	%	No.	%	No.	%
1.	30	100%	26	86%	30	100%	30	100%
2.	24	80%	22	73%	27	90%	17	56%
3.	7	23%	6	20%	10	33%	10	33%
4.	25	83%	25	83%	27	90%	16	53%
5.	25	83%	23	76%	28	93%	16	53%
6.	19	63%	24	80%	30	100%	21	70%
7.	26	86%	27	90%	27	90%	23	76%
8.	28	93%	25	83%	15	50%	6	20%
9.	19	63%	12	40%	10	33%	8	26%
10.	19	63%	17	56%	25	83%	18	60%
11.	8	26%	11	36%	26	86%	20	66%
12.	4	13%	3	10%	30	100%	22	73%
13.	12	40%	8	26%	18	60%	13	43%
14.	28	93%	25	83%	26	86%	17	56%
15.	6	20%	13	43%	8	26%	9	30%

Table 9 : Number of respondents following healthy practices at pre and post intervention stages

Question number	Number of correct response N (%)							
	Pre intervention				Post intervention			
	Experimental		Control		Experimental		Control	
	No.	%	No.	%	No.	%	No.	%
1	21	70%	16	53%	15	50%	9	30%
2	27	90%	21	70%	26	86%	22	73%
3	12	40%	15	50%	22	73%	16	53%
4	9	30%	11	36%	18	60%	9	30%
5	8	26%	5	16%	20	66%	12	40%
6	26	86%	29	96%	26	86%	27	90%
7	13	43%	19	63%	27	90%	19	63%
8	21	70%	29	96%	23	76%	28	93%
9	9	30%	7	23%	17	56%	5	16%
10	7	23%	10	33%	17	56%	18	60%

Knowledge assessment :

Before imparting the nutrition education the mean knowledge score (9.46) (Table 10) of control group and experimental group (9.36) (Table 10) was almost similar.

The education was imparted through different teaching aids to the experimental group and the knowledge level measured by redesigning the pre knowledge testing questionnaire. An increase in score was observed after intervention. The mean knowledge score are experimental group in 13.83 after conducting nutrition education. Now most of the subject had mark in range of 10-15 in post intervention stage.

Practice assessment :

Table 10 : Knowledge score of the two study groups at pre and post intervention stages

Knowledge	Pre Mean ± SD	Post Mean ± SD
Control group	9.46 ± 2.4	9.50 ± 2.5
Experimental group	9.36 ± 2.2	13.83 ± 10.7

Before imparting the nutrition education the mean practice score (5.26) Table 11 of the control group and experimental group (5.90) was almost similar.

After giving nutrition education an increase in score was observed. The mean practice score of experimental group 7.27 after nutrition education. Now most of the subject had the marks in range of 7.9 in post intervention stage.

Table 11 : Dietary practices scores of the two study groups at pre and post intervention stages

Knowledge	Pre Mean ± SD	Post Mean ± SD
Control group	5.2 ± 1.59	4.97 ± 1.30
Experimental group	5.9 ± 1.66	7.2 ± 1.48

Experimental group :

The mean score of knowledge and practice of experimental group was more in post intervention. Thus it was conclude that imparting education helped the experimental group in enhancing the knowledge level and healthy practices of the subjects.

Control group :

Mean practices score of control group in pre intervention was 5.26 and post intervention was 4.97 by comparing the mean score it was revealed that practices followed by control group was poor in post intervention.

The mean knowledge score of control group in pre

intervention was 9.46 and post intervention was 9.23. Comparing the mean score of two stage it was conclude that situation of control group was almost same as per intervention stage.

Table 12 : Student's T-test and corresponding P-value for knowledge and practices score between the two groups of students at post intervention stage

Scores	Experimental v/s control	
	t-calculated	p-value
Knowledge	2.0017	3.81
Dietary practices	2.0048	3.12

Table 13 : Student paired T-test and corresponding P-value for knowledge and practices score between the two groups

Groups	Pre V/S Post			
	Knowledge		Practices	
	t-cal	p-value	t-cal	p-value
Experimental	2.048	0.235 ^f	2.045	.000834
Control	2.045	0.657 ^{ns}	2.045	.04445

*At the level p<0.005 is significant N.S.= Non-significant

Test of significance (T- Test) :

Control v/s experimental (Pre intervention) :

The result indicate that there was no. significant difference (P>0.05) between the score of control and experimental group because P>0.05. Thus null hypothesis accepted.

Control v/s experimental (Post intervention) :

The result indicates that there was a significant difference in the score of control and experimental group at 5 per cent level. The (P<0.05) is significant. Here p value is 0.0267 and 0.0328 for knowledge score and dietary practices, respectively.

Experimental v/s experiments :

There was a significant difference in the knowledge score of experimental group at pre intervention and post intervention stage because (P<0.005) is significant (Table 12).

The dietary score of experimental group post intervention stage is significantly (P<0.005) higher than pre intervention stage. Here null hypothesis is rejected. It was conclude that there was significance difference in score of experimental group at pre intervention and post intervention.

Control v/s control :

The result indicate that score are not significantly

($P > 0.005$) higher. Control group at pre intervention and post intervention stage. Hence null hypothesis accepted which indicate that there is no significance difference between controls V/S control.

Summary and conclusion :

A recent study has shown the impact of Nutrition Education on the nutritional knowledge of adolescent girls. The objective was to study the prevalence of anemia among adolescent girls and to assess the dietary awareness and dietary practices of adolescent girls. It also gives suggestions and recommendations to improve their nutrition by making significant changes in dietary habits in order to reduce anemia. Sixty girls were selected by random Sampling. The knowledge level and Practice level pre-questionnaire was prepared to collect background information on the subjects. The background information included name, age, class, college name and food habits *i.e.* lacto-vegetarian, OVO vegetarian, non vegetarian, of the subject. A questionnaire was prepared to assess their knowledge about anemia and iron deficiency. A dietary assessment was an essential part and was done by an oral questionnaire (24 hours dietary recall) in which the subject were asked about the intake of each food item by using specific amount measured in cups. The nutritional intake of food was measured with the help of the ICMR book of Nutritive value. Calculation of energy, protein, iron and vitamin C was done and it was compared with the RDA reference, and the difference was calculated to mark the deficiency percentage. The subjects were introduced to nutrition and anemia after filling in the questionnaire. They used educational materials such as posters, charts, pamphlets, models, flash cards and leaflets. The same structured questionnaire was used to test nutritional knowledge level after the educational program. Nutrition knowledge was assessed by different types of methods with statistics as mean, medium range, mean standard deviation and the data was summarized in a table and results interpreted from the total data. The pre and post data information were

compared with each other and the final result obtained.

A significant difference ($P > 0.005$) was observed in the score of pre and post test of Nutrition Education intervention. Hence Nutrition Education is an appropriate, effective and sustainable approach to combat iron deficiency anemia.

LITERATURE CITED

- Gopaldas, T. (1996).** More nutrients, fewer parasites, better learning. *World Health Forum*, **17**: 367-368.
- Islam, M.J., Lamberg, C., Allardt, C, Bhyyan, M.A.H. and Salamatullab, C.L. (2001).** Iron status of Pre-menopausal women in two region of Bangladesh prevalence of deficiency in high and low social economic group. *Eur. J. Clin. Nutr.*, **55** : 598-604.
- Kindu, N. and Tupe, R. (2003).** Prevalence of iron deficiency anemia and its determinants in adolescents girls in urban slums: Abstracts of IX asian congress of nutrition. New Delhi. 236.
- Maphill, A.P. and Bothwell, T.H. (1992).** The prevalence and causes of nutritional iron deficiency anemia. In : foman SJ and jlotkin S (Eds.). Nutritional anemia Nestle Nutrition workshop series. New yark : Raven press. 30: 1-12.
- Moore, J.B., Pawloski, L., Radriguez, C., Lumbi, L. and Allinger, R. (2009).** The effect of a nutrition education program on the nutritional knowledge, hemoglobin levels and public health nursing. *J. Clin. Nutr.*, **26**: 144-152.
- NFHS-3 National Family Health Survey (2007). Mumbai: International institute for population sciences.44.
- Pirouznia, M. (2001).** The association between nutrition knowledge and eating behavior in male and female adolescent in the U.S. *Internat. J. Food Sci. & Nutr.*, **52**(2) :127-132.
- Vijayaraghvan, K. (2007).** Iron deficiency anemia in India and its control. *The Hind J. Nutr. Dietet.*, **44**: 107-114.
- World health organization (2000). Programming for adolescent health and development. Technical report series no. 886.

Received : 01.01.2016; Revised: 24.02.2016; Accepted : 09.03.2016