



International Journal of Nutrition and Agriculture Research

Journal home page: www.ijnar.com



IMPACT OF NUTRITION EDUCATION AND FOOD-BASED INTERVENTION ON ANAEMIC ADOLESCENT GIRLS

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ABSTRACT

Nutrition knowledge is an important factor that influences healthy eating habits. Nutritional status of an individual can be enhanced by improving dietary practices and this can solve many nutritional problems like anaemia. The present study was designed with objective to assess the impact of nutrition education and supplementation along with nutrition education on anaemic adolescent girls. This study was confined to adolescents (13-18 years). One hundred twenty anaemic adolescent girls of age group 13-18 years were selected from village Shera, district Panipat, Haryana purposefully. A self structured questionnaire was used to check their nutritional knowledge. Biochemical estimation was also done. Analysis of data was done using SPSS 16. Nutrition education was imparted to the subjects after assessing their nutrition knowledge. The subjects were divided into three groups. First group as control, second group (N.E.) was given nutrition education and third group (S.N.E.) was provided nutrition education along with iron- rich food supplement (roasted garden cress seeds incorporated atta besan laddoo). The result of the study showed that nutrition education improved the nutrition knowledge scores of the subjects. Average daily intake of all the nutrients also increased significantly among all the adolescent subjects. Further, biochemical parameters indicated that serum iron, percent saturation and serum ferritin concentration decreased non-significantly in N.E. group whereas a significant ($p \leq 0.05$) increase were noticed in S.N.E group (except serum ferritin). Thus, nutrition education and along with supplementation appeared a better method to enhance adolescents nutrition status. Ethical approval: The study protocol was approved by ethic committee, Kurukshetra University Kurukshetra. Participation in this study was voluntary.

KEYWORDS

Nutritional knowledge, Dietary practices, Anaemia, Nutrient intake, Adolescent and Supplementation.

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INTRODUCTION

Nutrition knowledge is the “knowledge of health and nutrition”. Nutrition knowledge is an important factor that influences healthy eating habits and ensures adequate availability nutrients to an individual throughout life. Healthy eating behaviour also enhances health and wellness by preventing disproportionate nutrients intake that could be associated with adverse health effects. To secure

societal health, there is a call for people to understand how to make use of a healthy diet for greater health benefits. Therefore, FAO, 2014¹ focus on nutrition education on food behaviour patterns by increasing knowledge on food value so as to improve dietary practices and consequently to enhance nutrition status of an individual.

Nutritional anaemia due to iron deficiency is the most prevalent nutritional problem in the world today. More than million people are affected by iron deficiency anaemia². Toteja, *et. al.*, has estimated that prevalence of anaemia in India is 90 per cent among adolescent girls. Anaemia, as defined by Skikne, 2007⁴ is “a deficiency in red blood cells (RBCs) or a decrease in haemoglobin and it is a symptom that can result from many underlying pathologies”. Haemoglobin is necessary for transporting oxygen from the lungs to other tissues and organs of the body⁵. Iron deficiency is not life threatening but it can have detrimental effect on work capacity, learning ability and resistance to disease. Once anaemia results, there is also impairment in cognitive performance and behaviour. Also, disturbances in vasomotor development have been found related to iron deficiency⁶. Among girls, it further causes pregnancy complications and lead to maternal and foetal mortality and morbidity⁷.

All these indirectly affect the development of a nation by decreasing the cognitive development of children and productivity of adult⁸.

In spite of various programmes started by government of India, no significant decline in the prevalence of anaemia has been reported. This has turned the interest towards food-based approaches that have higher potential and long lasting benefits to control iron deficiency anaemia. With the above background, the present study was formulated with the objective to assess the impact of nutrition education and supplementation along with nutrition education on anaemic adolescent girls.

MATERIAL AND METHODS

Locale of study

One hundred twenty voluntary school going anaemic adolescent girls (13 to 18 years) of Madlauda block,

district Panipat (Haryana) were purposefully selected for study.

Data collection

Interview

The first tool used was questionnaire-cum-interview method. This tool consisted of pre-tested questionnaire that was developed by taking opinion from Food and Nutrition experts from Department of Food and Nutrition, Kurukshetra University, Kurukshetra. The questionnaire gathered general information about subjects and nutritional knowledge about anaemia.

Nutritional knowledge

To gather information about nutritional knowledge a questionnaire consisted of thirty six questions was used. Nutritional knowledge regarding anaemia, its common cause, sign and symptoms, treatment, prevention was adjudged prior and after intervention. Each girl was individually interviewed within the institute. For each correct answer, score one was awarded whereas zero score to incorrect answer. For adjudging the level of anaemia related nutritional knowledge, scores were divided into four categories viz. poor (zero to 24.9%), average (25-49.5%), good (50-74.9%) and excellent (75-100%).

Development and composition of garden cress atta besan laddoo

Atta besan laddoo was developed by incorporation of roasted and grinded garden cress seeds at different level ranged from four to eight percent. Developed laddoos were subjected for organoleptic evaluation to a panel of ten judges (semi-trained and trained) of Department of Home Science, Kurukshetra University Kurukshetra using a nine point hedonic scale. Proximate estimation of most acceptable garden cress atta besan laddoo was done using AOAC, 2012 methods.

Biochemical assessment

The second tool was investigating tool. Haemoglobin level was checked using Cyanomethaemoglobin method. Diagnosis of anaemia was made by using WHO guidelines. Five ml of blood was drawn out using a sterilized disposable syringe. One ml of blood sample was carefully transferred to a test tube containing a pinch of EDTA for estimation of RBC. Rest four ml of blood was centrifuge at 2000rpm for

10min. Plasma stored was used for estimation of serum iron, TIBC, serum ferritin and Per-cent transferring saturation.

Intervention technique

One hundred twenty anaemic adolescent girls were divided into three groups. Group one control, group two (N.E.) was given nutrition education only and group three (S.N.E.) were provided nutrition education along with supplementation of two garden cress atta besan laddoo (140g) for a period of four months. Deworming was done prior to supplementation. Nutrition education was imparted once in a week for a period of four months. Nutrition education was imparted using audio visual aids on different topics viz. Balanced diet for adolescents, various nutrients requirement, their sources and function, importance of these nutrients especially iron and vitamin C in diet, nutritional deficiency disorders and their prevention, conservation of nutrients.

Statistical analysis

The data collected was statically tested. Descriptive (frequency, percentage, mean, S.D.) and t-test were used for data analysis using SPSS 16.

RESULTS AND DISCUSSION

Nutritional knowledge

General information about the studied subject showed that maximum (57.5%) girls were from age group of 13-14 years and 42.5 per cent were from 15-18 years of age.

Before imparting nutrition education average familiarity about meaning of anaemia were found in seventy five per cent of the subjects whereas fifteen per cent obtained poor. Good understanding about meaning of anaemia was observed in only ten per cent of respondents. When asked about cause of anaemia about one-half (52.5%) of the subjects had average knowledge whereas thirty per cent of the subjects had poor knowledge. Only five percent of the adolescent had excellent knowledge about cause of anaemia.

Figure in parentheses indicate percentage

I-Poor score (0-24.9%) II-Average score (25-49.9%) III- Good score (50-74.9%) IV – Excellent score (75-100%).

More than one-half (51.3%) and one-fourth (21.2 %) of the anaemic girls respectively, obtained average and poor scores respectively whereas nearly one-fifth (17.5 %) and one tenth per cent of girls had excellent and good understanding about symptoms of anaemia, respectively.

Most of the subjects (40%) had poor knowledge about treatment and prevention of anaemia. About one- third (32.5%) had an average knowledge followed by 27.5 per of respondents. None of the subject had excellent understanding about treatment and prevention of anaemia.

Thus Table No.1 inferred prior to nutrition education that majority (62.5%) had average knowledge about anaemia. About one-third had poor knowledge about anaemia. Good knowledge about anaemia was achieved by only five per cent of adolescent girls.

The results of the present findings are in lined with the findings of Marjan *et al* and Sachdeva^{9,10} who also found poor nutrition knowledge among adolescents.

The findings of the present study also revealed that after imparting nutritional knowledge to adolescent for period of four months, majority of the respondents (95%) had achieved excellent knowledge about meaning of anaemia and only five per cent of respondent acquired good knowledge of meaning of anaemia (Table No.1).

After imparting nutritional education to adolescents maximum of the adolescents (67.5%) acquired good knowledge about the cause, followed by excellent score (20%) and average score by 12.5 per cent of girls. The knowledge about symptoms of anaemia also improved. Sixty five and thirty five per cent scored good and excellent scores, respectively as compared to 10 and 17.5 per cent before imparting nutrition education.

The Table No.1 revealed that after imparting nutrition education, majority (65%) scored excellent score regarding treatment and prevention of nutritional anaemia. that was nil before imparting nutrition education.

Data of total score achieved by subjects also showed that nutrition education imparted to adolescents by using audio-visual aids, increase nutrition knowledge. Most of the respondents (75 per cent)

had good knowledge regarding nutritional anaemia. Five per cent had excellent knowledge regarding nutritional anaemia. Average knowledge was found among twenty per cent of adolescents. None of the adolescent had poor awareness regarding nutritional anaemia.

The results of the present investigation are in agreement with the results obtained from the similar studies¹¹⁻¹³. Other also reported a significant increase in the knowledge after implementation of nutrition education programme and gain in nutrition knowledge after imparting nutrition education to rural mothers^{14,15}.

Table No.2 revealed the effectiveness of the nutrition education that was measured in terms of gain in scores. The mean scores 17.2±3.76 obtained in the pre-test was increased to 31.12±1.46 after imparting nutrition education. The gain in nutrition knowledge scores was 13.92±2.3 and the quantum of improvement was 1.8 times. The increase in nutritional knowledge after imparting nutrition knowledge was similar with the findings of other study¹⁶.

The above table revealed that garden cress atta besan laddoo was most acceptable at six per cent level of incorporation of garden cress seed and the mean scores for overall acceptability was 8.2 ± 0.52. The result also indicated significant difference (p≤0.05) in scores for color, taste and overall acceptability.

The proximate estimation of most acceptable garden cress atta besan laddoo indicated that these laddoo were good source of energy (450Kcal/100g of laddoo) and protein (6.3g/100g). Iron and calcium content of these laddoo were 4.8mg/100g and 96.5mg/100g, respectively (Table No.4).

Table No.5 revealed the impact of food-based intervention on biochemical parameters of subjects. The result indicated that after four months of intervention in nutrition education group (N.E.) and supplementation with nutrition education group (S.N.E.) the mean haemoglobin (g/dl) level increased significantly (p≤0.05) from 9.97± 0.62 to 10.37± 0.51(4.01%) and 10.16± 1.0 to 11.22± 1.08(10.43%), respectively in both groups whereas no significant changes were noticed in control group. The mean RBC value declined from 4.61±0.66 to 4.36±0.45 10³/ml in nutrition education group (N.E.) whereas a significant (p≤0.05) increase (5.9 %) was observed in supplementation with nutrition education group (S.N.E.). In S.N.E. mean RBC value increased from 4.57±0.42 to 4.84±0.48 10³/ml.

Further the result indicated that serum iron, percent saturation and serum ferritin concentration decreased non significantly in control and N.E. group but in S.N.E group a significant (p≤0.05) increase were noticed in above stated parameters (except serum ferritin). Thus the daily supplementation of garden cress seeds incorporated atta besan laddoo was beneficial with respect to rise in haemoglobin levels and maintaining adequate iron status of anaemic girls. Before intervention programme, twenty three girls were iron deficient anaemic (serum ferritin less than 15ng/ml, percentage saturation less than 16) but after supplementation none were iron deficient anaemic.

Table No.1: Nutritional knowledge score obtained before and after nutrition education

S.No	Component	Pre Exposed(n = 80)				Post Exposed (n = 80)			
		I	II	III	IV	I	II	III	IV
1	Meaning of Anaemia	12 (15)	60 (75)	8 (10)	0	0	0	4 (5)	76 (95)
2	Causes of Anaemia	24 (30)	42 (52.5)	10 (12.5)	4 (5)	0	10 (12.5)	54 (67.5)	16 (20)
3	Symptoms of Anaemia	17 (21.2)	41 (51.3)	8 (10)	14 (17.5)	0	-	52 (65)	28 (35)
4	Treatment and Prevention of Anaemia	32 (40)	26 (32.5)	22 (27.5)	0	0	6 (7.5)	22 (27.5)	52 (65)
5	Total scores	26 (32.5)	50 (62.5)	4 (5)	0	0	16 (20)	60 (75)	4 (5)

Table No.2: Effectiveness of nutritional knowledge

S.No	Test	Average scores
1	Pre test	17.2±3.76
2	Post test	31.12±1.46
3	Gain in score	13.92±2.3
4	Quantum in improvement	1.8 times

Values are mean ±S.D

Table No.3: Sensory evaluation of garden cress atta besan laddoo

S.No	Food Preparation	Level of incorporation (%)	Colour	Appearance	Texture	Taste	Aroma	Overall acceptability
1	Garden cress atta besan laddoo	4	6.2±1.2	6.3±1.08	6.5±1.32	6.3±1.45	7.2±1.27	6.8±1.38
		6	7.5±1.03	7.9±0.83	8.3±0.50	7.5±0.68	8.5±0.52	8.2±0.52
		8	5.8±1.48	5.9±1.45	6.3±1.58	7.0±1.23	6.9±1.47	7.1±1.36
2	<i>F test</i>		4.02*	2.94 ^{NS}	2.03 ^{NS}	3.46*	2.94 ^{NS}	3.48*

* Significant at p≤0.05

Table No.4: Proximate estimation

S.No	Variable	Garden cress atta besan laddoo (per 100g)
1	Energy (Kcal)	450.1
2	Protein (g)	6.3
3	Fat (g)	11.73
4	Carbohydrates(g)	79.81
5	Ash(mg)	0.34
6	Iron (mg)	4.8
7	Calcium(mg)	96.5

Table No.5: Biochemical assessment before and after intervention

S.No	Parameters	Intervention Group	Before	After	Mean change (%)	t-value
1	Haemoglobin (g/dl)	Control	10.2±0.87	10.04±0.99	-0.16(-1.56)	-0.76 ^{NS}
		N.E	9.97± 0.62	10.37± 0.51	0.4(4.01)	3.15*
		S.N.E.	10.16± 1.0	11.22± 1.08	1.06(10.43)	4.55*
2	RBC(10 ³ /ml)	Control	3.9±0.31	3.8±0.29	-0.1(-2.56)	-1.48 ^{NS}
		N.E	4.61±0.66	4.36±0.45	-0.25(-5.42)	-1.97*
		S.N.E.	4.57±0.42	4.84±0.48	0.27(5.9)	2.67*
3	Serum iron (µg/dl)	Control	87.45±37.5	85.47±36.3	-1.98(-2.26)	-0.23 ^{NS}
		N.E	87.65 ±37.78	82.27± 32.16	0.1(0.12)	-0.68 ^{NS}
		S.N.E.	89.92± 40.05	109.46 ±34.36	19.54(21.7)	2.34*
4	TIBC (µg/dl)	Control	363.66±62.4	391.78±13.2	28.12(7.73)	3.27*
		N.E	380.39± 29.69	406.04± 24.58	25.65(6.74)	0.72 ^{NS}
		S.N.E.	390.31± 20.32	341.06±72.35	-49.25(-12.6)	-4.14*
5	Percent saturation	Control	24.04±14.44	21.8±9.2	-2.24(-9.31)	-0.82 ^{NS}
		N.E	23.04±11.10	20.25±8.7	-2.79(-12.10)	-1.25 ^{NS}
		S.N.E.	23.03±11.11	32.09±15.5	9.06(39.34)	3.00*
6	Serum ferritin concentration	Control	24.23±9.65	24.26±8.93	0.03(0.0)	0.01 ^{NS}
		N.E	34.37±20.32	32.33±16.7	-2.04(-5.93)	-0.49 ^{NS}
		S.N.E.	43.77±39	46.79±38.9	3.02(6.89)	0.34 ^{NS}

* Significant at p≤0.05 # Values are mean ± S.D

CONCLUSION

The results of the present investigation revealed that nutrition education was effective in increasing the level of nutrition knowledge as well as increase in haemoglobin. The significant increase of haemoglobin, RBC, serum iron and per cent age saturation shows a positive impact of supplementation with nutrition education. Thus, nutrition education and along with supplementation appeared better method to enhance adolescents nutrition status.

ACKNOWLEDGEMENT

The authors wish to express their sincere gratitude to Department of Home Science, Kurukshetra University, Kurukshetra 136119, Haryana, India for providing necessary facilities to carry out this research work.

CONFLICT OF INTEREST

We declare that we have no conflict of interest.

BIBLIOGRAPHY

1. FAO, Nutrition, education and awareness raising for the right to adequate food, *Thematic study*, 6, 2014, 32.
2. Ramzi M., Haghpanah S, Malekmakan L, Cohan N, Baseri A, Alamdari A and Zare N. Anemia and iron deficiency in adolescent school girls in Kavar urban area, Southern Iran, *Iran Red Crescent Med J*, 13(2), 2011, 128-33.
3. Toteja G S, Singh P, Dhillon B S, Saxena B N, Ahmed F U, Singh R P. Prevalence of anaemia among pregnant women and adolescent girls in 16 districts of India, *Food Nutr Bull*, 27(4), 2006, 311-5.
4. Skikne B. Anemia: diagnosis and treatment option for women, *The Journal of family Practice*, 2007. From <http://www.jfponline.com>.
5. NFHS-3, India's Undernourished Children: A Call for Reform and Action <https://books.google.co.in/books?isbn=0821365886>. International Institute for Population Sciences (IIPS) and Macro International 2007
6. National Family Health Survey 2005-06 (NFHS-3).
6. González H F, Malpeli A, Etchegoyen G, Lucero L, Romero F, Lagunas C, Lailhacar G, Olivares M, Uauy R. Acquisition of visuomotor abilities and intellectual quotient in children aged 4-10 years: relationship with micronutrient nutritional status, *Biol. Trace. Elem. Res*, 120(1-3), 2007, 92-101.
7. Kulkarni, Meenal, Vinay, Kulkarni, Durge P M, Kasturwar N B. Prevalence of anaemia among adolescent girls in an Urban Slum, *National journal of community medicine*, 3(1), 2012, 108-111. WHO, Third report on the world Nutirition Situation, 2006.
8. Vivek, Halappanavar R G, Vivek P R, Halki, Maled S B and Deshpande. Prevalence of Anaemia and its epidemiological, Determinants in Pregnant Women, *Al Ameen J. Med. Sci*, 5(3), 2012, 216-223.
9. Marjan Manouchehri Naeeni, Sakineh Jafari, Maryam Fouladgar, Kamal Heidari, Ziba Farajzadegan, Maryam Fakhri, Parvaneh Karami and Razieh Omidi Nutritional Knowledge, Practice, and Dietary Habits among school Children and Adolescents, *Int J Prev Med*, 5(Suppl 2), 2014, S171-S178.
10. Sachdeva R, Harvinder and Puri R. Anthropometry and iron status of pre-school children as influenced by supplementation and counselling, *Nutr. Abst. Rev*, 69, 1999, 6.
11. Debnath M and Agrawal S. Effect of Nutrition Education and Dietary Modification on the Health Status of Kindergarten Children: A Case-control Study, *J Nutr Food Sci*, 6(6), 2016, 559.
12. Ali Esmaeili Vardanjani, Mahnoush Reisi, Homamodin Javadzade, Zabihollah Gharli Pour and Elahe Tavassoli. The Effect of nutrition education on knowledge, attitude, and performance about junk food consumption among students of female primary schools, *J Educ Health Promot*, 4, 2015, 53.
13. Hosseini M, Shojaeizadeh D, Chalesghar M, Pishva H. A study of educational intervention

on knowledge, attitude, practice about iron deficiency anemia in female adolescent students, *Gorgan Univ Med Sci J*, 8(3), 2006, 37-43.

14. Gaikwad Surekha Ramrao. Impact of nutrition education on adolescent girls of Purna Maharashtra, *Advances in Applied Science Research*, 4(1), 2013, 386-391.
15. Tarvinder, Kochar J K, Taru G K. A Impact of nutrition education on nutrient adequacy of adolescent girls. Stud, *Home Comm. Sci*, 1(1), 2007, 51-55.
16. Thanuja B and Ramya V. Assessment of nutritional knowledge among adolescent girls and impact of nutrition education, *Cauvery Research Journal*, 1(1), 2007, 64-66.

Please cite this article in press as: Mamta Sharma. Impact of nutrition education and food-based intervention on anaemic adolescent girls, *International Journal of Nutrition and Agriculture Research*, 6(1), 2019, 20-26.