RESEARCH PAPER | Home Science | Volume : 4 | Issue : 8 | August 2014 | ISSN - 2249-555X

Effect of Supplementation of Sprouted Amaranth Seed Incorporated Snacks on The Iron Status of Moderately Anaemic Female Subjects

KEYWORDS

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ABSTRACT *Iron deficiency anaemia (IDA) is considered to be a national nutritional problem in India, especially among young women. The characteristic feature in IDA is a low haemoglobin level which leads to high risk pregnancy. Hence, there is an urgent need to seek and adopt feasible food based measures to tide over this national problem confronting women before they enter into marriage and pregnancy. Current understanding of biologic processes indicates that women's nutritional status before entering these phases of life play an important role in ensuring successful pregnancy outcomes. In view of this, it is evident that the 18- 22 year age group is the most critical period in a woman's life and equipping her mentally and physically by providing sound nutrition during these years is imperative as it would directly reflect on how her body would respond to physiological stress sooner or later. Food-based strategies can therefore be recommended to improve iron status of populations at risk of iron deficiency as these are more natural ways of preventing or treating IDA when compared to over-the-counter dietary supplements that are very expensive and cannot be afforded by all. Inclusion of known foods as well as underutilized foods that are rich in iron can be one prudent strategy to enhance the iron status the natural way without any side effects that may be caused by dietary supplements. Sprouted Amaranth seeds are rich in protein, vitamin C and iron. They are relatively underutilized in India. They have the potential to be integrated in food based strategies to enhance the iron status of individuals.*

INTRODUCTION

A food-based strategy has the goal of improving nutrition through increasing the consumption of a nutritionally adequate micronutrient rich diet made up of a variety of available foods. This study was carried out as a food based approach to estimate the effect of supplementation of sprouted amaranth seed on the iron status of the moderately anaemic female subjects aged between 18 to 22 years.

OBJECTIVES OF THE STUDY

1. To formulate and standardize the preparation of iron rich mid morning snacks incorporating sprouted amaranth seeds.
2. To supplement each snack in rotation on a weekly basis for a period of 60 days to moderately anaemic (Hb 7- 9.9g/dl (WHO, 1998)) female subjects aged between 18 to 22 years.
3. To study the effect of supplementation on the iron status of subjects by estimating the haemoglobin (Hb) level on the 0^{th} (day before commencement of supplementation) and 61^{st} (day after the end of the supplementation period).

METHODOLOGY

The methodology adopted in the study is discussed below

DESIGN OF THE STUDY

The design adopted in the study was a 'pre-test and post-test' experimental research design, with control group. The basic premise behind the pretest–posttest design involves obtaining a pre-test measure of the outcome of interest prior to administering some treatment, followed by a post-test on the same measure after treatment occurs. The present study was designed to determine the effect of supplementation of sprouted amaranth seed incorporated mid morning snacks on the iron status of fifteen moderately anaemic girls after supplementing it for 60 days. The Haemoglobin level of the subjects was analysed before the commencement of supplementation and after the period of supplementation, to study the effect of supplementation.

SCREENING AND SELECTION OF SUBJECTS

The 18- 22 years age group was chosen for the study, since this is the most crucial age in the life of a young woman just before marriage and pregnancy. Current understanding of biologic processes indicates that women's nutritional status before entering these phases of life play an important role in ensuring successful pregnancy outcomes. The study was conducted among women of this age group in a private college in Chennai.

Screening

Prior to the screening for Iron deficiency anaemia, the researcher obtained clearance from the ethical committee for the conduct of the study. Hundred students belonging to the age group of 18- 22 years, who were willing to undergo screening, were tested for haemoglobin levels. Amongst the students screened, thirty subjects with Haemoglobin levels between 7 to 9.9 g/dl (Moderately anaemic (WHO, UNICEF and UNU 1998)) were chosen as subjects.

Sample size

The thirty anaemic subjects were divided into two groups comprising of fifteen subjects each, one to form the control group and the other, the experimental group.

Standardization of recipes

Three recipes that is Chapatti roll, Boli and Ladoos were standardized. Hundred grams of sprouted Amaranth Seeds was incorporated in every serving of the recipes. The quantity of iron provided by one serving of each recipe was estimated in SGS laboratory, Chennai. The estimated values showed that each of the recipes provided 50

Volume : 4 | Issue : 8 | August 2014 | ISSN - 2249-555X

to 55 mg of iron per serving.

Administration of the supplement

Sprouted amaranth seeds incorporated recipes (chapatti roll, boli and ladoo) were supplemented in rotation on a weekly basis at 10 am for a period of 60 days to the experimental group. Subjects belonging to control group did not receive any supplementation. As indicated earlier, one serving of each recipe provided 50- 55mg of iron. The RDA for Iron for Indian women is 30 mg/ day (ICMR, 2010). This is 66.6 per cent more than the RDA of iron for this age group.

RESULTS AND DISCUSSION

Nutrient intake of the subjects

Prior to the commencement of supplementation, the three day dietary recall was used to calculate the intake of protein, carbohydrate, fat, fiber, iron and vitamin C. This was done to understand the nutrient intake as well as the choice of foods by the study group. The mean intake of these nutrients is tabulated in Table 1

Table 1 Mean nutrient intake of subjects

Nutrient	Recommended Dietary Allowance for Indians *	Mean ± S.D	
		Experimental group (n=15)	Control group(n=15)
Energy Kcal/d	1900	1424.2 ± 315.2	1449.7 ± 236.7
Protein g/d	55	43.6 ± 9.6	48.5 ± 8.7
Fats g/d	20	52.5 ± 13.1	55 ± 10
Carbohydrate g/d	397.5	193.9 ± 44.2	190 ± 29.8
Fibre g/d	21	18.8 ± 4.5	17.2 ± 3.5
Iron mg/d	30	13.7 ± 2.5	13.5 ± 2.8
Vitamin C mg/d	40	103.5 ± 51.7	76.1 ± 33.2

*** Revised standards - NIN, 2010**

The intakes for protein, carbohydrate, fiber and iron were well below the recommended allowances. The subjects were taking a diet that was severely deficient in iron. The intake of fat was twice as more as that recommended. The vitamin C intake was above the recommended allowance. The energy intake was well below the required intake.

Several studies augment the fact that inadequate intake of protein, iron, folic acid and vitamin B_{12} could be linked to high prevalence rate of anaemia as these are the elements required for hemoglobin formation (Bains and Mann (2000); Bains et al., (2003); Kumari and Singh (2003) and Shekhar (2004).

Effect of sprouted amaranth seed supplementation on the haemoglobin level

Haemoglobin levels of all the subjects were assessed at the beginning (0^{th} day) and end of the supplementation period (61^{st} day). The blood haemoglobin level was estimated by cyanomethaemoglobin method. A comparison of the mean haemoglobin values was made between the 0^{th} and 61^{st} day (0^{th} day Vs 61^{st} day) to study the effect of supplementation. The findings are presented in table 2.

TABLE 2 Comparison of Mean Haemoglobin values (0^{th} day Vs 61^{st} day)

Iron status	Experimental group		Control group		Experimental group (0^{th} day Vs 61^{st} day)			Control group (0^{th} day Vs 61^{st} day)		
	Mean ±SD									
	0^{th} day	61^{st} day	0^{th} day	61^{st} day	't' value	'p' value	Level of sig	't' value	'p' value	Level of sig
Hb (g/dl)	8.7 ± 0.703	11.2 ± 0.710	9.24 ± 0.341	9.46 ± 0.789	14.02	0.00	1%	1.343	0.200	NS

NS –Not significant

The haemoglobin level on the 0^{th} day was 8.7 ± 0.703 g/ dl, but after supplementation with sprouted amaranth seed incorporated snacks, it increased to 11.2 ± 0.710 g/ dl. The increase was statistically significant at 1% level. In control group, the haemoglobin on 0^{th} day was 9.24 ± 0.341 g/ dl and on the 61^{st} day, it increased to 9.46 ± 0.789 g/dl. But this increase was not statistically significant. This finding showed that the supplementation of sprouted amaranth seeds incorporated recipes had a positive effect on the haemoglobin level. It therefore has the potential to be used in food based strategies to prevent or treat iron deficiency anaemia.

Before supplementation, the subjects in the experimental group were moderately anaemic. But after the supplementation of sprouted amaranth seed incorporated snacks, their haemoglobin levels improved and they moved from the moderately anaemic to mildly anaemic category. A further improvement in the iron status may have been observed had the supplementation period been increased from 60 days to 90 days.

CONCLUSION

Amaranth seed is an exceptional source of iron and protein and the findings of the present study authenticates it. However, this seed remains underutilized in India. It is also a very good source of other vitamins and minerals. It could therefore be used in food based strategies to prevent or treat iron deficiency anaemia. It is a very good alternative source of iron for vegetarians. This pseudocereal is a gluten-free crop and can be supplemented to anaemic individuals who have to take a gluten free diet.

Amaranth seed has the potential to be an effective food fortificant, especially, when amaranth seed flour is added to regular wheat or rice flour; it will increase the nutritive value of the flour many times, specifically in terms of valuable proteins and iron. It is non-toxic, safe and can be consumed by any age group in order to improve the iron status. This study therefore strongly recommends the use of sprouted amaranth seeds in food based strategies to prevent or treat iron deficiency anaemia and malnutrition.

Volume : 4 | Issue : 8 | August 2014 | ISSN - 2249-555X

REFERENCE

• World Health Organization, UNICEF and United Nations University (1998). Iron Deficiency: Indicators for Assessment and Strategies for Prevention, WHO, Geneva, Switzerland. | • Bains. K., and Maan, S. K. (2000) Sub - clinical iron deficiency – A major factor in reducing physical fitness of young women. Ind. J. Nutr. Dietet. 37: 296 –300. | • Bains. K., Singh. I., and Kaur. R (2003) Impact of nutrition education on nutrition of rural adolescent girls belonging to western plain zone of Punjab. J. Res. PAU 40: 126– 131. | • Kumari. S., Singh. S (2003) Nutritional status of schedule caste adolescents from deprived section of society. Ind. J. Nutr. Dietet. 40: 147 –152. | • Shekhar. A (2004) Current iron status of girls and its effect on work performance. XXXVII Annual National Convention. 103: Indian Dietetic Association, AIIMS, New Delhi, India. | • National Institute of nutrition (2010) Indian council of Medical Research, Hyderabad, India. |