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Efficacy of iron rich *Mathri* on hematological parameter of hostel girls in Udaipur city

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ABSTRACT

Anemia is one of the glaring deficiencies in adolescent girls. A study was conducted to see the effect of developed iron rich *Mathri* on haemoglobin level of hostel girls in Udaipur. For the present study, sixty hostel girls were selected and estimated the haemoglobin level by Cyanmethaemoglobin method. The study revealed that, forty six per cent of girls were moderately anemic, thirty per cent were mildly anemic and ten per cent severely anemic. After nutritional analysis and *in vitro* availability of iron in developed *Mathri*, intervention study was conducted on selected subjects for one month by daily supplementation of *Mathri* (80g) providing 17.45mg of iron. Results of intervention (before and after) showed significant ($p < 0.05$) difference in haemoglobin level of the subjects.

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Key words : Anemia, Haemoglobin, *Mathri*, Intervention

INTRODUCTION

Nutritional adequacy is one of the key determinants of the quality of human resources everywhere. The problem of malnutrition in developing countries encompasses a spectrum of deficiencies of which the most devastating is a deficiency of one or more of the three micronutrients: iron, vitamin A and iodine (Seshadari, 1996). Anemia is one of the glaring deficiencies in adolescent girls, which they acquire from childhood and increases in extent and magnitude during the reproductive age. It is becoming increasingly evident that control of anemia in pregnant women may be more easily achieved if satisfactory iron status of the adolescent females can be ensured, prior to marriage.

Enrichment of diet with iron is promoted as a measure to combat anemia among adolescent girls because it is an efficient and cost effective means and can reach to a large population. There is a need to provide iron from food sources, which can be prepared at household level and positive steps towards prevention of major nutritional disorders in shorter duration. As with the advent of advertisement era a number of synthetic commercial preparation of iron have been introduced. This does not

seem to be very practical and the best solution and also due to the complication of synthetic iron therapy *i.e.* gastrointestinal distress which is most prominent as is seen in 15 to 20 per cent people.

Legumes in general and soybean in particular have a high iron and ferritin content (Beard *et al.*, 1996). Soybean occupies a premier position as a world crop because of its high virtually unrivalled protein content.

We need a radical departure in our strategy for combating anemia among population and the strategy should be beneficial among all sections, which should be less expensive, easily available, can be consumed with daily diets and easily acceptable so that the chances of mitigating the anemia problem would be far brighter.

Keeping above points in view, the present study was conducted to study the effect of developed iron rich *Mathri* intervention on biochemical status of anemic hostel girls.

MATERIALS AND METHODS

The present study was conducted in one of the girls hostel of Udaipur, Rajasthan. A group of 60 girls were selected purposively having age between 17 – 24 years.

They were interviewed using a prestructured performa. Nutritional status was assessed. It included anthropometric, clinical, biochemical and dietary data. Hematological examination was carried out using Cyanomet hemoglobin method of Dacie and Lewis (1975).

For development of iron rich recipe, soybean, lotus stem and chickpea leaves were selected on the basis of their iron content and easily availability. The ingredients required were procured in a single lot from local market.

Preprocessing of raw ingredients:

Preparation of soybean flour:

Soybean flour was prepared using dry heat method. Bean was soaked for 8 hours and then dried in an oven at 350⁰ F (175°C) for 25 minutes. Dried bean was then grinded to flour.

Preparation of chickpea leaves powder and lotus stem powder:

Procured chickpea leaves and lotus stem were washed in water, cut, shade dried and grinded into powder.

Preparation of niger seeds powder:

Niger seeds were cleaned, roasted for four minutes in a skillet and then grinded to powder.

Planned recipe *i.e.* *Mathri* was standardized in the laboratory of Foods and Nutrition Department, College of Home Science, MPUAT, Udaipur. Ingredients required for the recipe were weighed on electronic weighing balance of 0.001g accuracy. Recipe trials were conducted three times to standardize it. The recipe was evaluated by the staff and students of Food and Nutrition Department using a nine point Hedonic Rating Scale (BIS, 1971). Developed iron rich *Mathri* was analyzed by using NIN (2003) standard procedure for protein (Kjeldahl), fat (ether extraction), ash, fibre, iron. Moisture was determined using electronic moisture analyzer (Sartorius Moisture Analyzer). For assessing *in vitro* availability of iron, procedure of Rao and Prabhavathi (1978) was used. All determinations were made in triplicate and the average values were adopted.

To see the efficacy of developed iron rich *Mathri*, ten moderately anemic girls were selected and were given developed iron rich *Mathri* for a period of thirty days.

The data collected on different aspects as per the methodology were tabulated and statistically analyzed using Microsoft Excel 2007 to determine mean, standard error and the significant differences, if any. Findings are also illustrated diagrammatically.

RESULTS AND DISCUSSION

The results obtained from the analysis are presented and discussed in the following sequence. The mean height of the subjects was 160.08±1.37 cm whereas mean weight was 48.66±1.32 kg and BMI of the subjects was 19±0.43 kg/m². Only fifty-three per cent respondents were under normal BMI, while forty-three per cent were malnourished and only three per cent respondents were overweight (Fig. 1). The intake of energy among respondents were 72.44 per cent to the RDA, protein was 79.55 per cent, iron was 51.33 per cent and calcium was 78.53 per cent to RDA (Table 1).

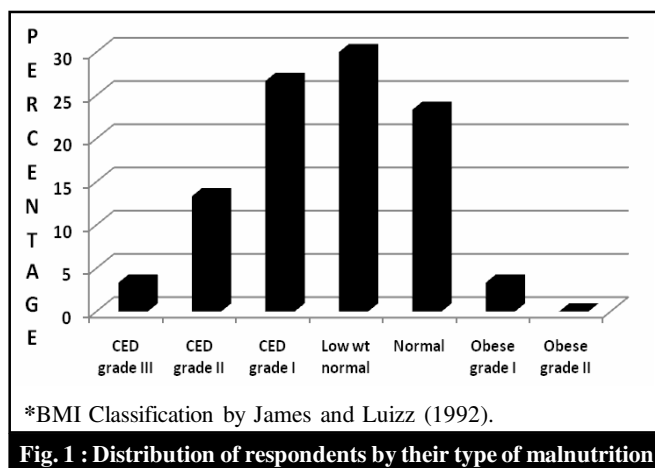


Fig. 1 : Distribution of respondents by their type of malnutrition

Table 1: Mean ± SE values of nutrient intake

Nutrients	Per day intake ± SE	RDA	Per cent to RDA
Energy (kcal)	1492.307±48.905	2060	72.44
Protein (g)	50.122±2.150	63	79.55
Fat (g)	37.580±1.859	22	168.18
Iron (mg)	15.405±0.820	30	51.33
Calcium (mg)	392.682±26.390	500	78.53

The prevalence of anemia (Fig. 2) revealed that a majority of respondents (forty six per cent) were moderately anemic. Thirty per cent with mild anemic whereas thirteen per cent were normal and ten per cent with severe anemia were observed. This may be due to faulty food habits and low intake of green leafy vegetables and iron rich foods.

For intervention, iron rich *Mathri* was developed and standardized using various unit operations. Sensory evaluation results (Table 2) revealed that the average mean value for flavour, texture and taste were 8.0±0.21, 7.7±0.15, and 7.6±0.22, respectively. Overall acceptability of fortified product was 7.8±0.11. Therefore fortified

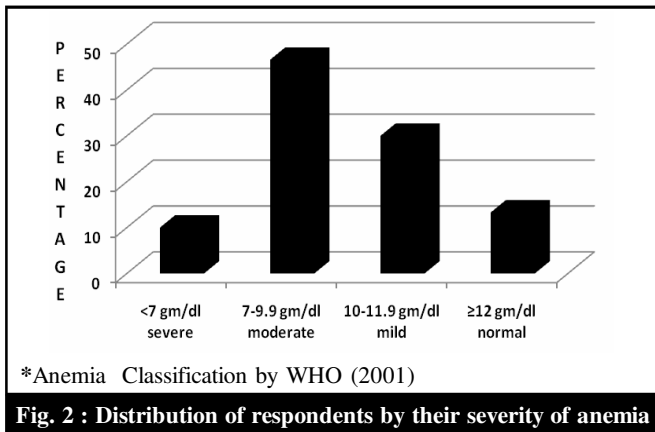


Fig. 2 : Distribution of respondents by their severity of anemia

Table 2 : Sensory evaluation of iron rich *Mathri*

Characteristics	<i>Mathri</i> (Mean ± SE)
Colour	7.2 ± 0.13
Texture	7.7 ± 0.15
Flavour	8.0 ± 0.21
Taste	7.6 ± 0.22
Overall acceptability	7.8 ± 0.11

Mathri were highly acceptable among the subjects. Results of nutritional analysis (Table 3) showed that *Mathri* contained 33.3±0.40 per cent moisture, 49.78±0.15 per cent protein, 3.69±0.46 per cent fibre and 21.82±0.7 mg iron of which 12.65±0.6 mg iron was bioavailable. From this, it can be concluded that, fifty per cent of iron was

Table 3: Nutritional analysis (per cent) of iron rich *Mathri*

Nutrients	Composition
Carbohydrate	535.92±0.82
Protein	49.27±0.63
Fat	9.78±0.15
Moisture	33.3±0.40
Ash	0.87±0.00
Fibre	3.69±0.46
Iron (mg)	21.82±0.07
Bioavailable iron (mg)	12.65±0.61

bioavailable and it could be supplemented in the diet of anemic subjects.

Dietary iron deficiency and anaemia afflict 1.5 billion people worldwide. The major strategies currently used to combat dietary iron deficiency include supplementation and fortification. Ten girls who were moderately anemic and willing to participate in the study were taken. The subjects were fed with 80g *Mathri* providing 17.45mg of iron as a daily supplement for 30 days.

Results of supplementation of developed *Mathri* on

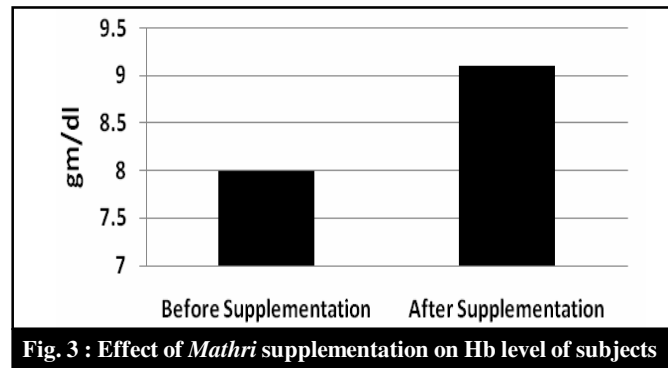


Fig. 3 : Effect of *Mathri* supplementation on Hb level of subjects

haemoglobin level showed significant ($p < 0.05$) difference. Mean haemoglobin level of subjects (Fig. 3) before supplementation was 8 ± 0.37 gm/dl, which increased to 9.12 ± 0.37 gm/dl at the completion of supplementation.

Conclusion:

Iron deficiency is a nutritional problem. Only thirteen per cent adolescent girls have normal haemoglobin level within the study population. The girl's diet appears to be inadequate, especially in bioavailable iron foods, and does not meet the high iron requirements coming in part from heavy menstrual blood loss in this population. Iron supplementation delivered and targeted to at-risk adolescents is an effective way to prevent anemia and iron deficiency, as well as to improve iron stores. Adolescent girls are willing to participate in interventions to prevent and control anemia.

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