

Efficacy of Iron Rich Leaf Concentrate on the Haemoglobin Level of Adolescent Girls (13 to 18 years) in an Orphanage of Jaipur city.

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Abstract : Around seventy per cent of the adolescent girls of India are anemic, as they require 15 % additional iron and folic acid. In the underprivileged group like orphans cheap and effective methods to treat anemia are a challenge. Leaf concentrate (LC) is a dark green extract from Lucerne which is extremely rich in micronutrients especially iron and folic acid. LC is known to improve the general health and particularly hemoglobin (Hb) levels. The present study was conducted on 25 adolescent girls residing in Balika Grah run by Social Welfare Board, Government of Rajasthan, Jaipur. Out of 25 girls, 12 comprised of experimental group and 13 were control. Experimental girls were given 15 gm LC every alternate day for a period of 3 months. Nutritional status of subjects was assessed using anthropometry, dietary, clinical assessment and hemoglobin estimation. Results showed that in spite of girls living in an orphanage were having normal growth and clinical profile. The hemoglobin levels were estimated at baseline, mid- intervention and after intervention. After supplementation period of 3 months significant increase in hemoglobin levels were observed.

Introduction: Adolescence is the process whereby an individual makes the gradual transition from childhood to adulthood, very often it is equated with puberty and cycle of physical changes culminating in reproductive maturity.¹ Adolescence is a period of great physical and physiological stress especially in girls as there is onset of menstruation. At menarche most girls become anemic.

Iron deficiency anemia is the commonest cause of nutritional anemia in India, which is indicated by reduction in concentration of hemoglobin in the peripheral blood below the accepted normal levels for the specific age group and sex of individuals.²

Several studies from various part of the country indicate that anemia in 10- 18 year old group is ranging between 50- 65 %.^{3,4} In developed world prevalence is 8 %, in developing world it is 36 % and in totality it is 30 %.⁵ Compared to these figures India has significantly higher number of anemic.

Managing anemia is one of the biggest challenges in India. Searching for novel and cheaper options is the need of the hour. Leaf concentrate (LC) is not a new food but merely a novel and better way of offering

greens humans. It is a product made by fractionating green vegetation and it is perhaps the richest untapped food resource on earth.⁶ Leaves commonly used to extract LC are Lucerne (*Medicago Sativa* L), Berseem (*Trifolium Alexandrinum* L), Green Leafy Vegetables like raddish, turnip, carrot, beet root tops and even obnoxious weeds like congress grasses could be used for extracting LC.⁷

LC is highly nutritious food. It is the richest source of iron folic acid. As little as 3 gm LC supplies the whole day requirement of beta- carotene and about 15 gm of LC meets over 75 % of other nutritional need in the diet and therefore LC scores over other alternative food sources.⁶ The feeding trials with LC supplementation have been carried by various nutritionists and food scientists and positive results have been reported on growth and hemoglobin levels, improving nitrogen retention, increase in serum protein and spontaneous revision of anemia.^{8,9,10,11}

Keeping this in mind the present study was undertaken- To Study the Efficacy of Iron Rich Leaf Concentrate on the Haemoglobin Level of Adolescent Girls (13 to 18 years) in an Orphanage of Jaipur city.

Materials and Methods : The present study was conducted in an orphanage "Balika Grah" run by Social welfare Board, Govt. of Rajasthan. The orphanage houses 65 girls between the age group of 6-18 years. All 25 girls between 13-18 years were selected for the study. Out of which 12 girls comprised group A (Expt. Grp) and 13 girls comprised group B (control group). The girls were given 15 gm dry LC in a Sachet to be dissolved and drunk like a tonic. It was given on alternate days for 3 months. After an interval of few days different preparations of LC were also given to the girls to bring change and to break monotony like Chikki, Biscuits, Laddu, Breadroll and sandwiches. The data was collected using a pretested and standardized questionnaire. Information regarding general data and personal hygiene and sanitation, regarding symptoms of anemia. Nutritional assessment was done using anthropometric measurement (height and weight, waist and hip circumference) dietary assessment (24 hr dietary recall), clinical examination (for nutritional deficiency disorders) and biochemical estimation (Haemoglobin).

Intervention Trial and Investigation

Pre Intervention	Intervention	Post-Intervention
<ul style="list-style-type: none"> Deworming 	<ul style="list-style-type: none"> Intervention period – 3 months 	<ul style="list-style-type: none"> Nutritional Status
Nutritional Status (i) Anthropometric measurement - Height (cm) - Weight (kg) - Waist Circumference (cm) - Hip Circumference (cm) (ii) Dietary Assessment- 24 hr. dietary recall (iii) Biochemical Estimation – Hb levels (gm%) (iv) Clinical Examination	<ul style="list-style-type: none"> Feeding of 15 gm LC/person every alternate day Constant touch of researcher with subjects to ensure consumption. Hb estimation after 1½ months & 3 months 	(i) Anthropometric measurement - Height (cm) - Weight (kg) - Waist Circumference (cm) - Hip Circumference (cm) (ii) Dietary Assessment- 24 hr dietary recall. (iii) Biochemical Estimation – Hb levels (gm%) (iv) Clinical Examination

RESULT AND DISCUSSION

The selected 25 orphan girls were divided into 2 groups, Group A (12 girls) who were given 15 gm LC for 3 months on alternate days; group B (13 girls) who were given no supplementation.

The findings revealed that all the girls were

going to school, were living in clean environment and the toilet facility was also clean. Most of the subjects had attained menarche and had common symptoms like weakness, dizziness and palor of skin.

Table 1: Changes in mean Anthropometric & Biochemical Parameters after Intervention with LC

		Experimental Group (n=12)		Control Group (n=13)	
		13-15 yrs (n=7)	16-18 yrs (n=5)	13-15yrs (n=4)	16-18 yrs (n=8)
Weight (Kgs.)	Pre	43.57±5.28	46.60±7.40	39.63±4.15	41.67±6.89
	Post	45.0±5.41	45.6±6.10	39.50±3.69	42.56±7.31
BMI (Kg/m ²)	Pre	18.9±2.14	21.5±2.80	17.49±1.88	19.23±2.10
	Post	19.35±2.25	20.9±1.98	17.33±1.64	19.60±.38
Hemoglobin (g%)	Pre	10.14±1.11	10.6±1.63	10.73±0.99	10.14±0.83
	Post	12.14±0.50	12.98±1.14	10.95±1.55	10.33±1.26

It was also observed that most of the girls were having normal height but had lower weight as compared to NCHS standards. The height and BMI of the girls improved after intervention (Table 1). The mean hemoglobin of girls was around 10g/dl before intervention. After intervention there was significant

increase in the hemoglobin levels of group A (experimental) girls, whereas no change in the mean hemoglobin level of group B (control) girls (Table - 2).

Table 2: ‘t’ values for Haemoglobin values of Group A and Group B

Age group (n=25)	N	Pre to mid Intervention	Mid to post intervention	Pre to post intervention
Group A	12			
13-15 yrs.	7	-2.844* (S)	-17.32** (HS)	-4.50** (HS)
16-18 yrs.	5	-2.07* (S)	-5.41** (HS)	-4.51** (HS)
** High Significant (HS) Difference between means, significant at 1% level of significant * Significant (S) Difference between means, significant at 5% level of significant				
Group B	13			
13-15 yrs.	4	-	-	1.027 (NS)
16-18 yrs.	9	-	-	3.0 (S)

NS – Non Significant

* Significant (S)

Discussion

The results of the present study showed an increase in hemoglobin levels by 20%, over an intervention period of 3 months. A similar study by **Mathur (1986)** carried out on 97 primary school children suggested an increase in hemoglobin levels. In this study the feeding trial with LC was for a period of 9 months and the rise in hemoglobin was 9.5% (from 10.5 g/dl to 11.5 g/dl) in group fed with

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3% LC and 16% increase (10.6 g/dl to 12.3 g/dl) in the group fed 9% LC.

Conclusion

Thus it can be concluded that leaf concentrate is a novel product which can be used for supplementation in various conditions like anemia. LC can bring about significant changes in the health of an individual suffering from common deficiency diseases arising from iron, folic acid and vitamin A.

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