

## Therapeutic impact of garden cress seeds incorporated laddoo among the selected anaemic adolescent girls (12-15 years)

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### ABSTRACT

Adolescents are the important segments of the global population. Their well being and the active participation are the fundamental needs for the development of the society. Nutritional problems of adolescent girls are common throughout the world. Iron deficiency anaemia is one of the global health problems which affect the people of all age groups. Particularly adolescent girls are more vulnerable to anaemia. Hence, iron supplementation is highly necessary to combat anaemia. So, the present study was carried out to assess the therapeutic impact of garden cress seed laddoo among the selected anaemic adolescent girls of the age group 12-15 years. Ethical approval for the study was obtained from the Government Ethical clearance committee. Screening for anaemia was conducted by assessing the haemoglobin level of the 505 adolescent school girls. From that, 200 moderately anaemic adolescent girls (each 100 in the Experimental Group and the Control Group) were chosen for further study. Assessment of nutritional status was carried out among the selected subjects. Haemoglobin status (biochemical assessment) of the selected subjects was assessed through cyanomethemoglobin method both prior and after the supplementation. Clinical examination was carried out with the help of a physician.

A laddoo of fifty grams containing garden cress seeds (5g), rice flakes (20g), bajra (5g), roasted Bengal gram dhal (5g), samai (5g) and 10g of jaggery was supplemented along with 5 grams of amla to 100 selected moderately anaemic adolescent girls in the Experimental Group for a period of 6 months. The laddoo contained 10 mg of iron. Deworming was done prior to the supplementation. Both deworming and supplementation was not given to the Control Group. After 6 months of supplementation, improvement was observed in the clinical signs of the Experimental Group. The haemoglobin level (g/dl) gradually increased from  $8.67 \pm 0.59$  to  $12.43 \pm 0.70$ . There was no specific change in the Control Group.

**Keywords:** Anaemia, adolescent, garden cress seeds, haemoglobin, clinical assessment

### INTRODUCTION

Nutrition plays a prime importance in human life from conception till the death. Anaemia is a condition in which the number of red blood cells and consequently their oxygen - carrying capacity is insufficient to meet all the body's physiologic needs. Iron deficiency is thought to be the most common cause of anaemia globally (Rakesh, 2015). Anaemia, defined as decreased concentration of blood haemoglobin, is one of the most common nutritional deficiency diseases observed globally and affects more than a quarter of the world's population (Kefyalew and Dohe, 2014). Anaemia is a major health problem that affects 25-50% population of world (Bhargavi and Roa, 2014). Anaemia prevalence was lower in boys than girls. Anaemia continues to be a major public health problem worldwide, particularly among females. The high prevalence of Anaemia among women in India is a burden for them their families, and for the nation (Bhai and Manju, 2014). Saravanakumar *et al.*, (2014) found

that among adolescent girls of Tamil Nadu, majority (49.1%) of the girls were moderately anaemic.

Adolescent girls are at high risk of developing iron deficiency anaemia because of increased iron demands during puberty, menstrual losses, and limited dietary iron intake (Namrata *et al.*, 2011) (Seeja and Usha, 2010).

The major consequences of anaemia are increased risk of maternal and child mortality followed by negative impacts on physical and mental development of children and decreased learning and work capacity and influencing on reproductive health in adolescents and adults (Ramzi *et al.*, 2011).

It is high time to prevent and control anaemia through supplementation. Though India is blessed with an array of nutrient rich natural foods, people are unaware of consuming and the therapeutic impact. Hence the investigator made an effort to assess the therapeutic impact of supplementing garden cress seeds incorporated laddoo which contained locally available, low cost and nutritious ingredients like garden cress seeds, rice flakes,

bajra, roasted Bengal gram dhal, samai and jaggery to combat anaemia. So, the present study was done to assess the therapeutic impact of garden cress seeds incorporated laddoo among adolescent girls of the age group 12-15 years in Dindigul district of Tamil Nadu.

#### **The following hypothesis was framed for the study**

The garden cress seed incorporated laddoo will improve the haemoglobin level of the selected moderately anaemic adolescent girls.

#### **METHODOLOGY:**

##### **Subjects:**

Three schools from two blocks viz., Dindigul block and Athoor block of Dindigul District were selected. These schools were selected after getting prior permission from the authorities. The investigator selected a total of 505 adolescent girls of the age group 12-15 years for screening anaemia. Prior to the actual conduct of the study, a good rapport was established among the teachers, students and their parents through proper counselling. The purpose and procedure involved in the study were clearly explained. The subjects were motivated effectively through an interactive session by the investigator and teachers to extend their full co-operation for successful conduct of this study. Demographic and socio economic informations were recorded using a pre-tested questionnaire. Information on frequency of consumption of foodstuffs was recorded using a food frequency questionnaire. The height and weight of the girls were recorded.

##### **Ethical clearance:**

Ethical approval for the study was obtained from Government Ethical committee. Written informed consent was availed from the subjects of the study.

##### **Screening for anaemia:**

Haemoglobin estimation was carried out by cyanomethaemoglobin method. Anaemia was classified

as per the WHO severity grading criteria. Thus anaemia is classified as non anaemic ( $\geq 12$  gm/dl), mild degree (11-11.9gm/dl), moderate (8-10.9gm/dl), severe ( $< 8$ gm/dl). Based on the willingness of the subjects, two hundred moderately anaemic adolescent girls were selected for further study. The subjects were divided into two groups each consisting 100 subjects viz., Experimental Group and Control Group.

##### **Deworming and supplementation:**

All the hundred anaemic subjects in the Experimental Group were dewormed by administering each a tablet of Albendazole (400mg). After deworming, the subjects in the Experimental Group were supplemented daily with a laddoo of fifty grams containing garden cress seeds (5g), rice flakes (20g), bajra (5g), roasted Bengal gram dhal (5g), samai (5g) and 10g of jaggery. The laddoo contained 10 mg of iron. The garden cress seeds incorporated laddoo was supplemented daily for a period of six months. For better absorption of iron, along with the supplementation 5g of fresh amla was deseeded and given for consumption after consuming the laddoo.

##### **Therapeutic impact of the garden cress seeds incorporated laddoo and analysis of data:**

The therapeutic impact of the garden cress seeds incorporated laddoo was assessed through biochemical assessment (haemoglobin levels) and clinical assessment. The values of the haemoglobin before (initial value) and after (final value) supplementation were compared and analysed through paired 't' test. Statistical analysis was carried out through spss17.

##### **RESULTS AND DISCUSSION:**

The age wise prevalence of anaemia among the selected moderately anaemic adolescent girls for the supplementation study given in Table 1.

**Table 1: Age wise prevalence of anaemia among the selected anaemic adolescent girls**

Age (yrs)	Experimental Group (N=100)		Control Group (N=100)	
	N/ %	Mean $\pm$ S.D	N/ %	Mean $\pm$ S.D
12+	28	13.04 $\pm$ 0.840	23	13.31 $\pm$ 1.022
13+	45		41	
14+	22		18	
15+	5		18	

N- Number of selected moderately anaemic adolescent girls

% - Percentage, S.D –Standard deviation

It is obvious from the above table that among the 200 selected moderately anaemic adolescent girls, a high prevalence of moderate anaemia was found among the age group of 13+ among the Experimental Group (45%) and Control Group (41%) followed by the age groups of 12+ (28%) and (23%), 14+ (22%) and (18%) and 15+ (5%) and (18%) among the Experimental and Control Groups

respectively. The mean age was found to be 13+. A study by Abudayya *et al.*, (2007) in Gaza Strip on adolescents aged 12–15 years reported that the prevalence of anaemia was 47.9% and 51.3% among boys and girls respectively.

The nutrient composition of the laddoo is shown in Table 2.

**Table 2: Nutrient composition of the garden cress seeds incorporated laddoo**

Nutrients	Content (50gms)
Calories (Kcal)	376.0
Protein (g)	12.80
Calcium (mg)	96.0
Iron (mg)	10.0
Bioavailability of iron (%)	4
Phytonutrient - Phytic acid (mg)	1.56

Fifty grams of the selected garden cress seeds incorporated laddoo consisted of 376 Kcal of energy, 12.8g of protein, 96mg of calcium, 10mg of iron and 1.56 mg of phytic acid. The bioavailability of iron was 4%. The total cost of 50 gms of the selected garden cress seeds incorporated laddoo was Rs.2.16.

The therapeutic impact of garden cress seeds incorporated laddoo on the haemoglobin levels of the selected subjects is given in Table.3 and Figure.1.

**Table 3: Therapeutic impact of the garden cress seeds incorporated laddoo on haemoglobin level (g/dl) of the selected anaemic adolescent girls**

Period	Experimental Group (N=100)	Control Group (N=100)	Normal reference range (g/dl)
Initial	8.67±0.59	8.35±0.50	12-14
Final	12.43±0.70	8.46±0.55	
Paired mean difference	3.75±0.90	0.11±0.76	
t-Test (p value)	0.00*	0.136 <sup>NS</sup>	

N- Number of selected moderately anaemic adolescent girls,

\* (P<0.05) significant at 5% level; NS (P>0.05) - Not Significant

The results of the study revealed that the mean haemoglobin level has significantly increased among the subjects of the Experimental Group than the Control Group after supplementation of the garden cress seeds incorporated laddoo for a period of six months. The mean haemoglobin level increased from 8.67±0.59 to 12.43±0.70 in the Experimental Group. On an average there was an increase of 3.8g of haemoglobin over a period of six months. This increase might be attributed to the iron content of the food mix. The result of the paired 't' test (p value) was 0.00.

Statistically it was inferred that as the result of the 't' test (p value) 0.00 was lower than the  $\alpha$  value (0.05) at 5 per cent level of significance the hypothesis framed that the

garden cress seeds incorporated laddoo will improve the anaemic status of the selected anaemic adolescent girls was accepted and the results proved that there was a significant difference (p<0.05) between the initial and final values of the haemoglobin level of the Experimental Group.

In the Control Group also the mean haemoglobin level increased from 8.35±0.50 to 8.46±0.55. On an average there was an increase of 0.1g of haemoglobin. This might be due to the intake of iron rich foods in the routine diet. The result of the paired 't' test was 0.136.

Statistically it was inferred that as the result of the 't' test (0.136) was higher than the  $\alpha$  value (0.05) at 5 per cent level of significance, it proved that there was a non

significant difference ( $p>0.05$ ) between the initial and final values of haemoglobin level of the Control Group. Sirimavo *et al.*, (2014) revealed that supplementation of

5mg of garden cress seeds for two months have raised the haemoglobin level from 8.50 gm/dl to 9.83gm/dl.

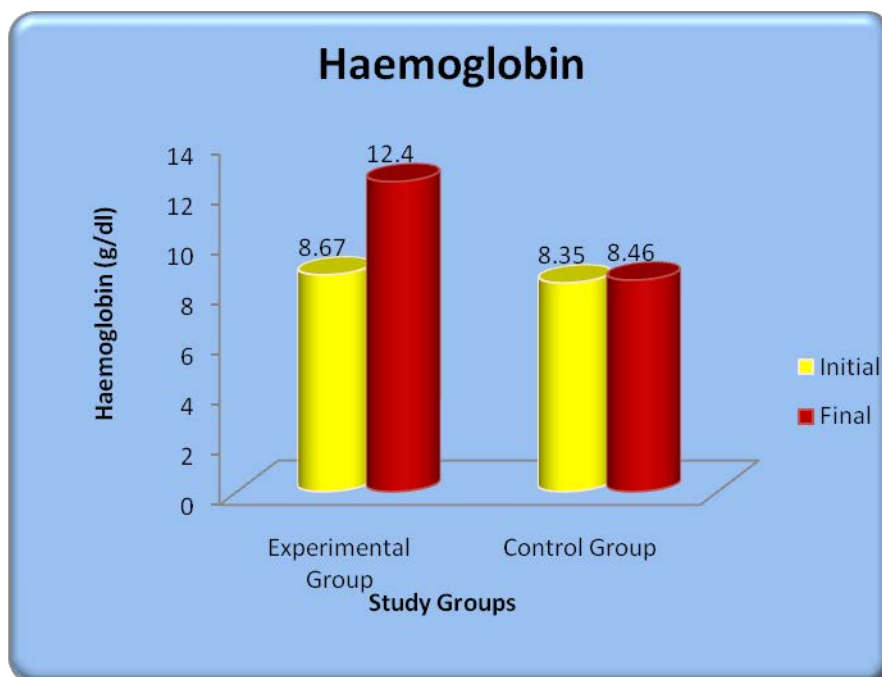


Figure 1: Therapeutic impact of garden cress seeds incorporated laddoo on haemoglobin level

The therapeutic impact of garden cress seeds incorporated laddoo on clinical signs and symptoms of the selected anaemic adolescent girls is shown in Table 4.

Table 4: Impact of garden cress seeds incorporated laddoo on clinical symptoms of the selected anaemic adolescent girls

Signs and Symptoms	Experimental Group (N=100)*		Control Group (N=100)*	
	Initial	Final	Initial	Final
Fatigue	20	-	20	22
General weakness	21	-	21	25
Lack of interest	21	5	21	21
Head ache	6	1	20	23
Paleness of the eyes	5	-	5	6
Koilonychia	-	-	-	-
Pale conjunctiva	20	-	18	20
Dry and rough skin	10	5	8	6
Angular stomatitis	20	-	15	19
Cheilosis	2	-	2	4
Swollen bleeding gum	5	-	5	10
Dental caries	5	5	10	10

\*Multiple responses, N- Number of selected moderately anaemic adolescent girls

Before supplementation, the clinical examination carried out among the selected two hundred moderately anaemic adolescent girls revealed that general weakness and lack of interest was found among 21 per cent of the

subjects in the Experimental and Control Groups respectively and followed by fatigue (20%). Twenty per cent of the subjects in the Experimental Group and eighteen per cent of the subjects in the Control Group

had pale conjunctiva followed by angular stomatitis which was present among 20 per cent of the Experimental Group and 15 per cent of the Control Group. Ten per cent of the subjects in the Experimental Group and eight per cent of the subjects in the Control Group had dry and rough skin. Head ache was reported by 6 per cent subjects of the Experimental Group and 20 per cent subjects of the Control Group.

After supplementation for a period of six months, there was a drastic improvement in the clinical signs and symptoms of the subjects in the Experimental Group. The condition of dry and rough skin, head ache, lack of interest reduced but all the other signs disappeared. This change might be due to the supplementation of the garden cress seeds incorporated laddoo. But among the subjects of the Control Group, the prevalence of the signs and symptoms aggravated.

### CONCLUSION:

The results of the study have well proved that the supplementation of garden cress seeds incorporated laddoo have shown improvement in the haemoglobin level and clinical signs and symptoms of the selected moderately anaemic adolescent girls. This emphasises to increase the awareness of using locally available nutritious foods. As the combination of these ingredients possesses therapeutic impacts in improving the haemoglobin level the supplement can be used for treating anaemia. Hence, it can be concluded that anaemia can be prevented and controlled through these iron rich locally available foods.

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