

Effect of Garden Cress Seeds Incorporated Health Mix among Selected Anaemic Adolescent Girls (12-15 Years) in Dindigul District, Tamil Nadu, India

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Abstract: Iron deficiency anaemia is one of the global health problems. Anaemia affects all age groups i.e., infants, children, adolescents, pregnant women, lactating women and aged people. Adolescent girls are highly vulnerable to anaemia. Hence, iron supplementation is highly essential to combat anaemia. So, the present study was done to assess the effect of garden cress seeds incorporated health mix among anaemic adolescent girls of the age group 12-15 years. Fifty grams of the health mix contained garden cress seeds (5g), rice flakes (20g), bajra (5g), roasted Bengal gram dhal (5g), samai (5g) and 10g of jaggery. The supplement contained 10 mg of iron. The mix (50g) was supplemented daily for a period of six months for 100 anaemic adolescent girls. Haematological parameters like haemoglobin, red blood cell count, packed cell volume, mean corpuscular volume, mean cell haemoglobin, mean corpuscular haemoglobin concentration, serum iron, total iron binding capacity, serum transferrin, transferrin saturation and serum ferritin level were assessed before and after the supplementation to assess the effect of the health mix. After supplementation, the mean haemoglobin level raised from 8.23 ± 0.49 to 11.11 ± 0.4614 and there was a significant improvement in all the parameters. It was concluded that supplementation of the garden cress seeds incorporated health mix had a good effect.

Keywords: Anaemia, adolescent, garden cress seeds, health mix, haemoglobin, haematology

1. Introduction

Nutrition plays a paramount importance in human health from womb to tomb. 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). It is estimated that anaemia causes more than 115,000 maternal and 591,000 perinatal deaths globally per year (Salhan and Tripathi, 2012).

Anaemia has a variety of converging contributing factors including nutritional, genetic, and infectious disease factors; however, iron deficiency is the cause of 75% of anaemia cases (Balarajan et al., 2011). It is a major health problem that affects 25-50% population of world (Bhargavi and Roa, 2014). Adolescence in girls has been recognized a special period of transition from girlhood to womanhood. Adolescent girls constitute one fifth of the female population in the world. Nutritional anaemia is one of India's major public health problems. Adolescence is a vulnerable period in the human life cycle for the development of nutritional anaemia. Anaemia in adolescent girls contributes to maternal and foetal mortality and morbidity in future (Kulkarni et al., 2012). During adolescence anaemia is more prevalent in both sexes due to growth spurt especially in girls where they are exposed to risk of onset menarche (Premalatha et al., 2012). Iron deficiency anaemia affects the development of the nation by decreasing the cognitive development of children and productivity of adults (Vivek et al., 2012).

India's experience with decades of iron supplementation programmes has been less than satisfactory. The challenge, therefore, is to increase the intake, bioavailability and

absorption of iron in the system (Gopalan, 2014). It is high time to prevent and control anaemia through supplementation coupled with nutrition education. Hence the investigator made an effort to supplement a health mix incorporated with garden cress seeds, which contained locally available 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 effect of garden cress seeds incorporated health mix among anaemic adolescent girls of the age group 12-15 years in Dindigul district of Tamil Nadu.

2. Methodology

Subjects

Five 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 1011 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 information's 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 clearance for the study was obtained from Government Rajaji Hospital, Madurai of Tamil Nadu. 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 Normal ($>11\text{gm/dl}$), mild degree ($9\text{-}10.9\text{gm/dl}$), moderate ($7\text{-}8.9\text{gm/dl}$), severe ($<7\text{gm/dl}$), very severe ($<4\text{gm/dl}$) (Bhargavi and Roa, 2014). One hundred moderately anaemic adolescent girls were selected for the supplementation study.

Biochemical assessment

The haematological parameters such as haemoglobin, red blood cell count, packed cell volume (PCV), mean corpuscular volume (MCV), mean cell haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), serum iron, total iron binding capacity, serum transferrin, transferrin saturation and serum ferritin level were assessed before and after the supplementation.

Deworming and supplementation**Table 1:** Effect of Garden cress seeds incorporated health mix on iron status – I (N=100)

Haematological parameters	Initial	Final	Paired mean difference	t Test (p value)
Haemoglobin (g/dl)	8.23±0.49	11.11±0.46	2.8±0.3280	0.00*
Red blood cell count(m/m ³)	3.47±0.17	4.20±0.18	0.73±0.24	0.00*
Packed cell Volume (%)	24.34±1.59	32.15±1.79	7.8±1.47	0.00*
Mean Corpuscular Volume (cu micron)	70.24±4.88	76.50±4.72	6.2±5.38	0.00*
Mean corpuscular Haemoglobin (mcg)	23.77±1.62	26.45±1.38	2.68±1.67	0.00*
Mean corpuscular Haemoglobin concentration (mcg)	33.85±1.20	34.61±1.37	0.7603±1.35	0.00*

N- Number of anaemic adolescent girls,* (P<0.05) significant at 5% level

The result of the study revealed that the mean haemoglobin level has significantly increased from 8.23±0.49 to 11.11±0.46 after supplementation of the garden cress seed incorporated health mix for a period of six months. On an average there was an increase of 2.8g of haemoglobin. This increase might be attributed to the iron content of the health mix.

Statistically it was inferred that as the result of the 't' test (p value) 0.00 was lower than the α value (0.05) at 5 per cent level of significance, it proved that there was a significant difference (p<0.05) between the initial and final values of haemoglobin level. 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.

There was an increase in the mean total red blood cell count from 3.47±0.17 to 4.20±0.18 m/m³. The initial mean of the packed cell volume was 24.34±1.59. After supplementation it increased to 32.15±1.79. This might be due to the effect of

All the hundred anaemic subjects were dewormed by administering each a tablet of Albendazole (400mg). After deworming, these subjects were supplemented with fifty grams of the health mix containing garden cress seeds (5g), rice flakes (20g), bajra (5g), roasted Bengal gram dhal (5g), samai (5g) and 10g of jaggery. The health mix contained 10 mg of iron. The garden cress seed incorporated health mix was supplemented daily for a period of six months.

Effect of the health mix and analysis of data

The effect of the health mix was assessed through biochemical assessment i.e., haematological parameters. The values of the haematological parameters before (initial value) and after (final value) supplementation were compared and analysed through paired 't' test. Statistical analysis was carried out through spss17.

3. Results and Discussion

The effect of garden cress seeds incorporated health mix on the iron status of the anaemic adolescent girls is discussed below. Table 1 shows the effect of supplementation of garden cress seeds incorporated health mix for a period of six months on various haematological parameters of the selected anaemic adolescent girls.

the iron rich health mix. The mean initial value of mean corpuscular volume was 70.24 ± 4.88 which increased to 76.50 ± 4.72 after supplementation. This improvement might be due to the supplementation. The mean initial value of mean corpuscular haemoglobin increased from 23.77±1.62 to 26.45±1.38 mcg. This improvement might be due to the supplementation. The paired 't' test value was 0.00. The mean corpuscular haemoglobin concentration raised from 33.85±1.20 to 34.61±1.37.

Statistically it was inferred that as the results of the 't' test (p value) 0.00 was lower than the α value (0.05) at 5 per cent level of significance, it proved that there was a significant difference (p<0.05) between the initial and final values of all the haematological parameters given in the above table. Table 2 depicts the effect of Garden cress seeds incorporated health mix on various haematological parameters such as serum iron, total iron binding capacity, serum ferritin, transferrin saturation, serum transferrin among the selected anaemic adolescent girls.

Table 2: Effect of Garden cress seeds incorporated health mix on iron status – II (N=100)

Haematological parameters	Initial	Final	Paired mean difference	t Test (p value)
Serum iron ($\mu\text{g/dl}$)	32.73 \pm 2.54	39.3 \pm 2.71	6.6 \pm 2.89	0.00*
Total iron binding capacity ($\mu\text{g/dl}$)	328.8 \pm 29.1	360.0 \pm 24.4	31.1 \pm 17.6	0.00*
Serum Ferritin($\mu\text{g/dl}$)	11.04 \pm 2.67	14.17 \pm 2.53	3.13 \pm 0.93	0.00*
Transferrin saturation (%)	10.02 \pm 1.10	10.98 \pm 1.10	0.96 \pm 0.64	0.00*
Serum Transferrin ($\mu\text{g/dl}$)	234.86 \pm 31.5	228.2 \pm 28.12	6.6 \pm 10.57	0.028*

N- Number of anaemic adolescent girls,* (P<0.05) significant at 5% level

It is clear from the above table that before supplementation, the initial mean serum iron level was 32.73 \pm 2.54 and after supplementation for a period of six months, there was an average raise from 6.6 \pm 2.89. Sangeetha and Premakumari (2010) found that supplementation of 100gms of nutritious ball containing rice flakes, jaggery etc for 6 months among anaemic school children increased the mean serum iron levels from 43.7 - 72.3 mcg/dl (p < 0.01).

The Total iron binding capacity increased after supplementation. The range of increase was from 328.8 \pm 29.1 to 360.0 \pm 24.4.

Iron Deficiency Anaemia in adolescents is defined as serum ferritin below 12 ng/ ml and haemoglobin level below 12g/dl for females and lower than 12.5 g/dl for males (Anand et al., 1999).

There was a significant improvement in the final value of serum ferritin. There was a raise in serum ferritin from 11.04 \pm 2.67 to 14.17 \pm 2.53 which might be due to the supplementation. There was an average difference of 3.13 \pm 0.93 between the initial and final values.

Before supplementation, the mean transferrin saturation level was 10.02 \pm 1.10 but after six months the mean transferrin saturation level was 10.98 \pm 1.10. Statistically it was inferred that as the results of the 't' test (p value) 0.00 was lower than the α value (0.05) at 5 per cent level of significance, it proved that there was a significant difference (p<0.05) between the initial and final values of all the above discussed parameters.

The initial mean transferrin saturation level was 234.86 \pm 31.5 and the final mean transferrin saturation level was 228.2 \pm 28.12. The mean difference was 6.6 \pm 10.57 and the p value was 0.028.

4. Conclusion

From this study it can be concluded that, the garden cress seed incorporated health mix had a significant effect on the haematological parameters of the anaemic subjects. Hence it works to combat anaemia. As the ingredients are locally available and cheaper at cost, the health mix can be suggested in schools, canteens and Integrated Child Development Services (ICDS) for supplementation. As it is easy to consume, it can be consumed at all ages. Further, more researches can be carried out with an aim to combat anaemia using locally available foods.

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