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SOME SOLUTIONS TO INTRA UTERINE GROWTH DEFICIENCIES AND IRON DEFICIENCY ANEMIA USING GARDEN CRESS SEEDS

Sirimavo Nair*, Shrela Meghani and Vidhushekhar Tripathi
Department of Foods and Nutrition, Faculty of Family and Community Sciences, Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India.

*Corresponding Author: sirinair@yahoo.com

ABSTRACT

Objectives of the study the prevalence of Iron Deficiency Anemia (IDA), impact of Garden Cress Seeds (GCS) powder supplementation and Iron Folic Acid (IFA) tablets to combat Intra Uterine Growth Deficiency (IUGD) in tribal setup of Bharuch district. Pregnant women Subject N= 76 (Experimental N=38, Control N=38) were enrolled through existing ICDS setup. Anthropometry and Haemoglobin (Hb) assessment were carried out of both the groups. Group 1 was experimental groups and Group 2 was control group. All subjects received one packet of sheera, sukhdi and upma each from government setup as a part of improving maternal nutritional status. Along with which, Group 1 were provided Garden Cress seeds as a supplement and Group 2 was given Nutritional Health Education (NHE) to combat IUGD. Statistical analysis carried out using SPSS version 17.0. From the study it was concluded that the women benefited in terms of Body Mass Index (BMI), Hb values, dietary pattern. BMI increased in Group 1 (2.03 kg/m²) and Group 2 (1.61 kg/m²). Eighty percent women were moderately anemic, 12% mild and 8% were in normal category. Haemoglobin level was increased by 1.32 gm/dl among Group 1 from baseline (p=0.0001). GCS (5gm/day) brought a better impact on Pre-Term Deliveries (PTDs), where no PTDs were observed by the end of the study. It is suggestive that, GCS proved beneficial in terms of combating IUGD when supplemented at second phase/trimester of pregnancy for 2 months.

Key words: Iron Deficiency Anemia (IDA), Garden Cress Seed (GCS), Intra Uterine Growth Deficiency (IUGD), Pre term Deliveries (PTDs).

INTRODUCTION

Pregnancy and lactation are anabolic states that are orchestrated via hormones to produce a redirection of nutrients to highly specialize maternal tissues (i.e., placenta and mammary gland) and their transfer to the developing fetus or infant which is characteristic feature of reproduction (Picciano, 2003).

Preterm birth is a major challenge for maternal and prenatal care worldwide and a leading cause of neonatal morbidity and mortality. Children born prematurely have higher rates of learning disabilities, cerebral palsy, sensory deficits, and respiratory illnesses compared to children born at term. These negative health and developmental effects of preterm birth often extend to later life, resulting in enormous medical, educational, psychological, and social costs. An estimated 28% of the 4 million annual neonatal deaths are due to preterm birth. Approximately 12.9 million babies are born preterm ever year, with a global prevalence of 9.6% (Vashishtha, 2009); women suffering from severe anemia had increased risk of maternal deaths, fetal outcome was better when haemoglobin during pregnancy was at least 8.0g/dl, Geelhoed *et al*., 2006

Globally, anemia affects 1.62 billion people which correspond to 24.8% of the population. From which pregnant women are 41.8% which means 56 million women. In addition, from south East Asia is 48.2% which means 18.1% women are affected with anemia (WHO, 2009).

Maternal health and newborn health are closely linked, three million newborn babies die every year, additional 2.6 million babies are stillborn (Cousens *et.al.*, 2009 and WHO fact sheet, 2012). Mortality rates show a steep increase when maternal Hb levels fall below 5.0 g/dl. Anemia directly causes 20 percent of maternal deaths in India and indirectly accounts for another 20 per cent of maternal deaths (Maternal Mortality in India 1997-2003 and Kalaivani, 2009).

Therefore the present study made an attempt

- To assess the prevalence of iron deficiency anemia among pregnant women in tribal area.

- To supplement Garden cress seeds (GCS powder) to the population along with IFA tablets as a tool to combat Intra Uterine growth disorder (IUGD).
- To study the impact of Garden Cress seeds supplementation on Hb levels of anemic subjects.

METHODS AND MATERIALS

Bharuch district is iron and iodine deficient pocket area as per defined by ICMR in Gujarat. From 4 blocks total 135 subjects were enrolled, further 84 subjects remained for the study from 2010. Of these 14 (27%) children died after delivery, 1 was still birth. Researchers have prior exposure to the area during internship tenure. Therefore a representative village was selected in 2011, named Kondh which comes in Daheli PHC. All subjects enrolled in anganwadi were enrolled for the study. The total subjects enrolled for the study were 76 (including dropouts) from this place. The study was carried out for 11 months. They were in the government scheme where pregnant women's were getting packets of sheera, sukhdi and upma on monthly basis. They contained defatted soya bean, green gram, oil, salt, dries vegetables and sugar.

COLLECTION OF GENERAL INFORMATION

The general information was collected from all the enrolled subjects, which includes age, sex, religion, education and occupation of the family members, per capita income, socio-economic status, KAP regarding iron rich foods.

ANTHROPOMETRIC MEASUREMENTS

Anthropometry was carried out during pregnancy since it is an indirect indicator to monitor the growth of foetus.

FOOD AND NUTRIENT INTAKE

Adequate nutrient intake is especially important during periods of rapid growth, especially during pregnancy with respect to foetal health. The food and nutrient intake of the present subjects were assessed by 24 hour dietary recall method and food frequency method. Haemoglobin Estimation: The most feasible quantitative measurement for iron deficiency anemia is estimation of haemoglobin levels.

- Left hand ring finger was first wiped with spirit swab and the wiped with a clean filter paper, in order to avoid haemolysis with alcohol.
- Sterilized needles used for pricking finger tips
- Blood sample was drawn by micro pipette and spot was made on filter paper.
- Samples were brought to laboratory and filter paper was cut and transferred in the test tube having Drabkin's reagent.
- It was then vortexed for few sec and diluted Hb was allowed to stand for 30min to achieve full colour development. Samples were read the same day colorimetrically at 540 nm.

STATISTICAL ANALYSIS

The data was entered into Microsoft excel Spreadsheet and then subjected to appropriate statistical analysis using Microsoft Excel Data analysis package. Further, the data was transferred to SPSS programme and data was analyzed using SPSS software version 17.0. Mean, standard deviation, percentages, and frequency distribution were carried out wherever applicable. Correlation, Students't' test and Paired't test were used to find out statistical significance between or within the groups. A CI of 95% was maintained throughout the study.

RESULTS

In present study it was observed that mean weight in Group 1 at initial stage (at 4th month) was 45.48 kg which increased to 50.51 kg after counseling for good nutrition ($P<0.001$) and in Group 2 initially the weight was 44.65 kg which increased to 48.66 kg who was not on supplementation. The improvement of weight in Group 1 was of 5.03 kg and that of Group 2 it was 4.01 kg at the end of the study.

The impact of food intake was noticed on BMI of the subjects and it revealed that, initially 62% of the women were undernourished which reduced up to 20%. Further 38% of the women were in normal category which improved 80% after 2 months of intervention (Table 1).

Table 1 BMI of pregnant women after Counseling

BMI indicators	Subjects (N=27)		Control (N=33)	
	Pre N (%)	Post N (%)	Pre N (%)	Post N (%)
Underweight	17 (63%)	1 (4%)	23 (70%)	11 (33%)
Normal	10 (37%)	26 (96%)	10 (30%)	22 (67%)
Overweight	0	0	0	0
Obese	0	0	0	0

Table 2 depicts the impact of nutrition counseling on BMI of the subjects in both experimental and control group. After 2 months supplementation to Group 1 there was rise of 2.05 kg/m², and in Group 2 the rise was 1.61 kg/m², which shows that there is shift from underweight to normal category.

The results of Hb indicated that, there was rise of 1.32 gm/dl in Hb in Group 1 which is statistically significant ($p<0.001$) (Table3). Before intervention the mean Hb levels of the experimental subjects was 8.50gm/dl and after the supplementation of GCS the mean Hb was 9.83gm/dl.

Table 2 Impact of Garden Cress Seeds on BMI of the subjects

Groups	BMI (MEAN ± SD)	
	Pre	Post
Subjects (N=27)	18.28 ± 1.7	20.33 ± 1.65**
Control (N=33)	17.83 ± 1.57	19.44 ± 1.68*

**p<0.001as compared to pre BMI, *p<0.05 as compared to pre BMI

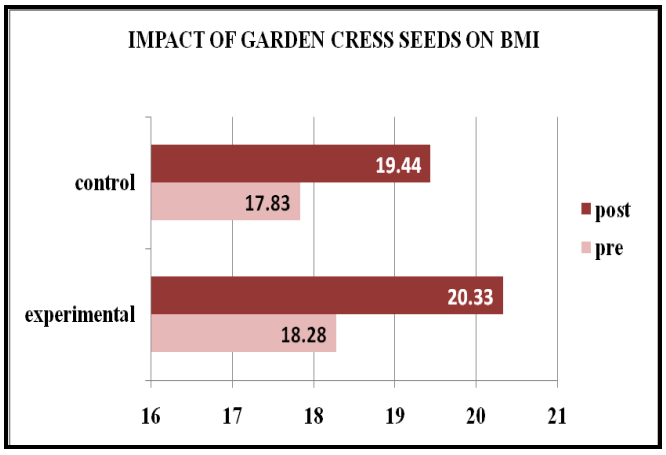

Figure1 Impact of Garden Cress Seeds on BMI

Further observations from table 3 reveal that, there was a non-significant rise of 0.13 gm/dl in Hb of the Group 2 (P≤0.162). The rise may be due to nutrition counseling imparted to this group. Thus it was observed that, prolonged intermittent and individual counseling on nutrition can bring better effect on the Hb level of the population.

The data revealed that, between experimental and control group the post analysis of haemoglobin level showed the difference of 1.17 gm/dl. This could be due to the fact that consistent consumption of 5 mg of iron from Garden Cress seeds for 60 days brought this rise. Thus it can be said that garden cress seed supplementation plays a role to increase the haemoglobin level in short span of 2 months time. Prolonged exposure needs to be tested for the said increase to better levels.

Table 3 Hemoglobin levels after the GCS supplementation

Groups	Hb levels MEAN ± SD	
	Pre	Post
Subjects (N=27)	8.51 ± 0.77	9.83 ± 0.92*
Control (N=33)	8.53 ± 0.79	8.66 ± 0.89†

*p<0.001as compared to pre Hb levels, †p≤0.162 as compared to pre Hb levels

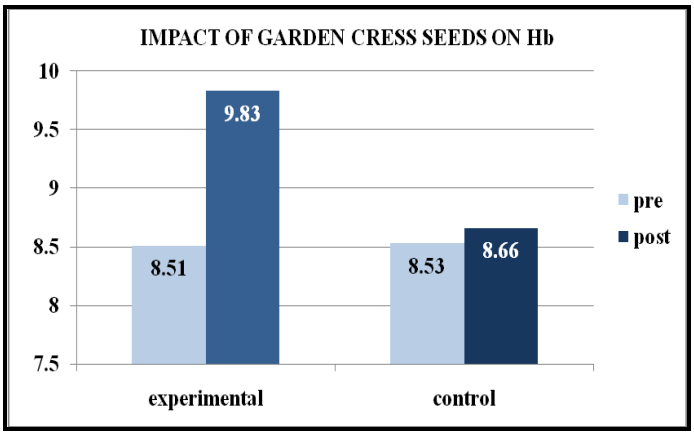

Figure 2 Impact of Garden Cress Seeds on Hb

Table 4 indicates that total dietary intake of the pregnant women. Increase in energy values from pre to post intervention period which was significant (p<0.001). It increased from 679 kcal to 1113 kcal. There was significant increase in energy value (p<0.001), protein value (p<0.001) and carbohydrates value (p<0.001). There was a slight increase in the iron intake from 6 mg to 7 mg; the increase was non-significant (p≤0.149). Difference of 122 mg was observed in calcium intake of the pregnant women. Vitamin C intake also increased significantly from pre to post intervention period. There was an increase of 3.8 mg in Vitamin C and 122 mg in calcium from pre to post intervention period (p<0.001). Thus it can be concluded that there was a significant change in dietary intake of the women with respect to all nutrients especially those of prime concern i.e. iron which are important for alleviating the haemoglobin status i.e. improvement in anemia status of the pregnant mothers.

Table 4 Dietary intake of pregnant women before and after intervention

Nutrients	RDA	Mean ± SD		Difference
		Pre	Post	
Energy (kcal)	2175	679 ± 149	1113 ± 133**	434
Protein (gm)	65	36.65 ± 11.95	60.89 ± 19.06*	24.24
Fat (gm)	30	9.89 ± 5.3	20.82 ± 8.75*	10.93
CHO (gm)	175	126.03 ± 26.83	203.23 ± 22.66*	77.2
Iron (mg)	38	6.94 ± 3.11	7.99 ± 3.56†	1.05
Calcium (mg)	1000	116.15 ± 80.09	238.25 ± 166.54*	122.1
Vitamin C (mg)	40	10.83 ± 6.96	14.63 ± 4.88*	3.8

*p<0.001as compared to pre dietary intake †p≤0.149 as compared to pre dietary intake

DISCUSSION

In the present study it was observed that, initially there were 63% women of Group 1 in underweight category and after counseling there was only 4%. Initially in Group 2 70% and 30% women were in underweight and in normal category respectively which decrease to 33% in underweight and 67% in normal category after the intervention which shows that counseling plays an effective role on the nutritional status of the pregnant women. This study has an intervention period of 2 months which shows that even short span of counseling can have an effect on the nutritional status on an individual.

The results indicated that there was rise of 1.32 gm/dl in Hb of the Group 1 which is statistically significant (p<0.001), which is suggestive that there was improvement observed at 15.52% in the population. This further implicates that even in short span of time, an iron supplementation can bring an alteration in the health status of the individuals. After 2 months intervention it has been concluded that the mean increase of Hb level was 0.13 gm/dl in Group 2 which not statistically significant (p≤0.162). The rise may be due to nutrition health education given to this group. Further it is suggestive that prolonged more individual counseling can bring better effect on the Hb level of the population.

Similar study revealed that among the women receiving oral iron-folate, the majority 39 (40.21%) showed an increase of Hb of up to 0.5 gm/dl, while in the iron sucrose group the majority of 34 (53.10%) showed a greater rise of 0.6 - 0.9 gm%. Approximately, eleven subjects (17.2%) in the iron sucrose group showed an increase in Hb of over 2.0 gm/dl while only three subjects (3.09%) in the oral iron-folate group showed a similar increase (Divakar, 2008).

Of the 76 subjects enrolled, the frequency distribution for haemoglobin levels of the subjects revealed range values from 7 to ≥11 gm/dl. It was also observed that most of the mothers had iron sufficiency at term birth.

During pregnancy iron is transferred from mother to foetus across placenta. This process is characterized by the uptake at brush border cells in the form of iron – transferrin, which binds to transferrin receptors. The complex is internalized by endosomes, iron released is transformed by cytoplasm by the metallo transporter which is Divalent In Nature (DMT1) (Gambling *et.al.*, 2001).

The placental iron transport during last trimester of pregnancy determines the iron endowment of neonates. Nutrition counseling played an important role in increasing the nutrient content of an individual. Thus it can be concluded that there was a significant change in dietary intake of the women with respect to all nutrients especially those of prime concern i.e. iron which are important for alleviating the haemoglobin status i.e. improvement in anemia status of the pregnant mothers.

CONCLUSION

Thus it can be concluded that supplementation of Garden Cress seeds (5gm/day) brought betterment in the health status of mothers, where it helped in reducing pre term deliveries.

Further the nutritional status of mothers had improved in term of Energy, Protein and CHO.

It was also evinced from the study that an increase of Hb by 1.32gm/dl was due to the 5mg iron provided from Garden Cress seeds. The study demands some more intervention studies to be carried out in this area in future.

ETHICAL APPROVAL

Approval from Institutional ethical committee based on ICMR guidelines has been obtained. The draft proposal along with study design was discussed in the committee. Further inputs have been modified as per suggestions. Written informed consent was availed from the subjects included in the study and the approval number is**:** F.C.Sc. / FND / ME / 72

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CONTRIBUTION OF AUTHORS

Work carried out and preparation of manuscript by Meghani S., Concept and Idea, Correction, modification and editing of manuscript by Nair S., provision of field support Dr. Tripathi VS

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