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ORIGINAL ARTICLE

EFFECT OF DRUMSTICK LEAVES SUPPLEMENTATION IN TREATING IRON DEFFICIENCY ANEMIA IN WOMEN OF REPRODUCTIVE AGE GROUP (15-45yrs)

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ABSTRACT

Background: Anemia is one of the most common causes of malnutrition and it has a great public health significance affecting children, adolescents and women of reproductive age worldwide. Iron deficiency anemia (IDA) is highly prevalent among the reproductive age group of Indian women mainly from lower socio economic status. Nearly 80% of the women with anemia suffer from Iron deficiency anemia (IDA). This study was done with the intention of finding an efficient substitute in the form of non haem iron of vegetable origin drumstick leaves by administering as supplementation to treat anemia. **Methods and materials**: One group pre-test and post-test pre experimental design was used. Women belonging to lower socio-economic status in rural area Pichavaram aged between 15-45years were te target Population. Using convenient sampling technique of 65 women suffering from Iron deficiency anemia were selected. Based on the signs and symptoms, anemia was diagnosed using cynmethaemoglobin method. As intervention 100gm of cooked drumstick leaves poriyal was given on alternate days for three months. After three months the hematological levels were analyzed and recorded. At the end of the supplementation period (90 days). **Results**: The subjects showed a significant improvement in Hb level at ($P<0.001$ level). This study has revealed that drumstick leaves poriyal had significantly improved mean hemoglobin levels in the post test other hematological variables significantly increased Hb from 10.43± 0.89 to 10.85 ± 0.87 g/L RBC (dL) 4.05±0.34; HCt, 37.78±3.48%; MCV 93.48±3.46 (fl); MCH, 26.98±(P_g): MCHC, 28.87±0.64 (g/dL) respectively observed in the sample population of anemic women ($p<0.0001$). This simple and low cost technology can be promoted in the community to prevent the acurance of iron deficiency anaemia.

Keywords: Drumstick leaves, iron deficiency anaemia, women, reproductive age

1.INTRODUCTION

Iron deficiency anemia is one of the most widespread preventable nutritional disorders in the world, despite the continuous implementation of global programs for its control. Globally 50% of anemia is attributed to iron deficiency and accounts for approximately 841,000 deaths annually worldwide, Harrison (2012). In India amount 80% of women are iron deficient which includes both pregnant and non pregnant. It is one of the most neglected disorders since it does not have any typical presentation unless the iron deficiency is severe. Some of the common causes of iron deficiency are inadequate intake of iron and folic acid, chronic or acute blood loss, mal absorption, hookworm infestation and menstrual problems. Clinically it usually presents with pallor, fatigue, reduced capacity to work, cheilosis, and koilonychias. Diagnosis maybe based on various methods such as measuring the hemoglobin levels, serum ferritin levels and total iron binding capacity (WHO-2001). According to WHO criteria anemia is classified as mild anemia with Hb level ranging from 11- 11.9gm/dl ,moderate anemia from 8-10.9 gm/dl and severe anemia is less than 8gm/dl of haemoglobin. Hemavathi et.al., (2015) reported that drumstic leaves tea was effective in reducing the levels of blood pressure among hypertensive clients.

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Moringa oleifera tree has probably been one of the most underutilized tropical crops. Leaves of *m. oleifera* could serve as a valuable source of nutrient for all age groups. The leaves are known as great source of vitamins and minerals being served raw, cooked or dried. Fuglie (2005) reported that *M. oleifera* dried leaf powder of serving will satisfy a child with 14% of the protein, 40% of the calcium, 23% of iron and nearly all the vitamin A that a child needs in a day. One 100g portion of leaves could provide a women with over a third of her daily need of calcium and give her important quantities of iron, protein, copper and sulphur and B-vitamins. (Oduro et al., 2008) Introduction of *Moringa oleifera* leaves cooked poriyal as part of the diet in Tamil nadu has been successful despite the fact that new foods are often very difficult to introduce; the fact that moriga leaves plays a role in fighting anemia in women of reproductive age group (15-45 yrs). Based on this, the present study attempts to reveal and prevent iron deficiency anemia in rural community, Pichavaram, Tamilnadu by supplementing drumstic leaves for womens suffering from iron deficiency anemia.

NEED FOR THE STUDY

Iron deficiency anemia is the most prevalent disorder among Indian women in the reproductive age group between (15 to 45yrs) .In Bangalore39%of the women were found to be having anemia of which 95% were due to iron deficiency Prashanth Thankachan et,al.(2008). There is a paucity of literature regarding the beneficial effects of *Moringa oleifera* (drumstick leaves) and jaggery in treating iron deficiency anaemia (Arcanjo et.al. 2009). Therefore the present study was under take with the objective of studying theeffect of vegetable source in the form of drumstick leaves (*Moringa oleifera*) supplementation in improvement of women suffering from iron deficiency anemia.

OBJECTIVES

- To compare the effectiveness of drumstick leaves supplementation in prevention of anemia among women of reproductive age.

ASSUMPTIONS

- Anemia is more prevalent among women of reproductive age group because they don't consume adequate diet containing iron rich food.
- Reproductive age group of women may have less knowledge about anemia.
- Dietary supplementation of drumstick leaves can contribute to combat iron deficiency anemia.
- Collection of blood sample for Hb estimation is a therapeutic and painful procedure which can cause discomfort to the client.

DELIMITATIONS

a. The study was delimited to the women between the age group of 15-45 years who attained menarche.

b. Onlytwo samples of blood were collected for pretest and post test for estimation of Hb gm/dL.

c. Only Cyanmethaemoglobin method was used to estimate the Hb level.

2.MATERIALS AND METHODS

The study was carried out in rural area at Pichavaram village. One group pre-test and post-test pre experimental design was used .In this study the target group consisted of women with mild anemia. Using convenient sampling technique 65women living in south pichavaram village between 15 to 45 years with their hemoglobin levels between 9 to 12 grams% were selected as samples. Pregnant women, lactating women and women with hemoglobin levels below 9gms were excluded from the study. Written permission was obtained from the President, South Pichavaram, Chidambaram. Also ethical clearance was obtained from the ethical committee of R.M.M.C.H to conduct the study. The study was conducted over a period of 3months, from April to June, 2013.The purpose of the study was explained to every respondent so as to get their full co-operation and consent was obtained from them. Before intervention haemoglobin level was checked. Women with Hb level ranging from 9gm/dl – 12gm/dl were included in the study. Intervention was started with 100gm of cooked drumstick leaves supplementation once a day on alternate day for three months. Inhibitors of iron absorption such as tea and coffee were withheld along with the dietary supplementation during the intervention. At the end of the study after 3 months 2ml of blood was drawn through venipuncture from all women in EDTA tubes. The samples were transported in a portable ice box to the laboratory within 3hours and hematological indices were assessed.

Data analysis: The data collected were coded. Descriptive (Mean, Standard Deviation) and inferential statistics (unpaired't' test) were used for data analysis.

3.RESULTS

Table no 1: shows the distribution of demographic and gynecological characteristics of the subjects. Out of 65 subjects more than 30(46.2%)of them belongs to 15- 25 years, regarding education majority of the subjects 41(63.1%) had illiterate ,16(24.6%) of the subjects had primary education, while taking the occupation majority of the subjects 52(80%) had coolie ,As for the monthly income of family 56(86.2) of them were less than Rs.2000,considering menstrual history,52(80%) of them having regular menstrual cycle,13(20%) of them having irregular menstrual cycle ,more than 54(83%) of them had 1-3 days menstrual flow and 11(17%) of them had 1-4 days menstrual flow. In number of abortion 38(58.5%) of the member didn't had any abortion,27(41.5%) member had only one abortion, As per the parity status 53(81.5%) of the subjects had more than two children.

Table 1.Distribution of demographic and gynecological variables of the respondents

Variables	Frequency	Percentage
Age(in years)		
15-25yrs	30	46.2
26-35yrs	27	41.5
36-45yrs	8	12.3
Education		
Illiterate	41	63.1
Primary	16	24.6
Higher	8	12.3
Occupation		
House wife	12	18.5
Coolie	52	80.0
Employee	1	1.5
Income		
Below Rs.2000	56	86.2
Rs.2001- 4000	8	12.3
AboveRs.4001	1	1.5
Menstrual cycle		
Regular	52	80
Irregular	13	20
Duration of Menstrual flow		
1-3days	54	83
1-4days	11	17
>4days	0	0
Number of Abortion		
None	38	58.5
One	27	41.5
Parity status		
One child	5	7.7
Two children	7	10.8
More than two children	53	81.5

Table 2: Pre and Post-test hematological and biochemical variables of the subjects on anemia

N =65

Level of biochemical Variables	Pre- test		Post- test		Paired 't' Test value	P -value
	Mean	SD	Mean	SD		
Hb(g/L)	10.43	0.89	10.85	0.87	5.37	<0.001 (s)***
RBC(/dL)	3.961	0.40	4.05	0.34	1.84	<0.069 (NS)
HCT(%)	34.37	8.06	37.78	3.48	3.17	<0.002 (s)**
MCV(fl)	91.54	5.30	93.48	3.46	2.55	<0.013 (S)
MCH(pg)	26.30	1.34	26.98	0.98	3.32	<0.002 (s)**
MCHC(g/dL)	28.85	0.59	28.87	0.64	0.24	<0.807 (NS)

***Significant at p <0.001 level**Significant at p <0.01 level*Significant at p <0.05 level

The above table.2, reveal the estimated mean and standard deviation of hematological variables of the subjects before and after intervention. It revealed that before giving the dietary supplementation the mean hemoglobin level of the subjects on anemia was found to be 10.43±0.89 but after the dietary supplementation 100gm of cooked drumstick leaves poriyal on alternate days for 3 months their mean hemoglobin level was found to be improved to10.85±0.87which was highly significant at p <0.001 level. whereas in the hematological variables in the pretest HCT% was found to be 34.37±8.06 in the posttest it was increased to 37.78±3.48 and the pretest mean cell volume score was found to be 91.54±5.30 which was found to be slightly increased during post-test to 93.48±3.46. The improvement was verified by the Paired't' test and it was found to be significant at p <0.001 level. It indicated that the intervention was found to be effective in improving the hemoglobin level and the hematological variables of the subjects.

3.DISCUSSION

Anemia is the most common health problem among the women of reproductive age. Anemia results in weakness and decreases the productivity of an individual. Anemia was higher among young women, women belonging to low socioeconomic status, women with higher parity and short pregnancy intervals (Noronha et.al, 2008). When the prevalence of low Hb values is more than 5% in the population, it is regarded as a public health problem. On the basis of Hb concentrations, the WHO established the following criteria for assessing the public health significance of anemia: if its prevalence in the general population is 5–19.9% – low; 20–39.9% – moderate; and ≥40% – severe. Due to the varying distribution of social and biological risk factors for anemia and the fact that it can lead to medical, social and economic consequences, epidemiological studies of anemia are becoming increasingly important (Beutler and Waalen , 2006)

The present study findings revealed that demographic data and gyneacological data of the women included the age, education and number of children majority of women belonged to the age group of 15-25 years (46.2%), most of them (63.1%) had the illiterate level of education. As per the parity status 53(81.5%) of the subject had more than two children. The paired't' test revealed that the difference was highly significant at P<0.001 level. Based on the objective drumstick leaves supplementation was very effective in improving the haemoglobin levels of mild and moderately anemic women. Due consideration should be given to the intervention to drumstick leaves as one of the recepies in the daily diet as a preventive and maintenance strategy. Even in this study the researcher has stressed all the women to grow drumstick tree in each and every houses to add and drumstick leaves regular meal for the whole family. The drumstick tree (moringa oleifera) referred to as the "miracle plant' is the most widely cultivated species of a monogetic amily, the moringaceae that is native to the sub. Himalayan part of India, Pakistan, Bangladesh and Afghanistan Palade and Change, 2003). The leaves are outstanding as a source of vitamin A, B group and C, and are among the best plant source of minerals. They contain more iron than "kontonmire, seven times the vitamin C in oranges, four times the calcium in milk, four times the vitamin a in carrots, two times, the protein in milk and three times the potassium in bananas (Sengev et al., 2013).

A study conducted by Idohou-Dossou et al. (2011) on moderately anaemic lactating women were randomly chosen and were given a weekly dose of 100gms of *Moringa oleifera* powder as opposed to iron and folic acid (120 mg and 0.5mg) of the control group. After 3 months of therapy there was a significant rise in haemoglobin levels (p<0.001) but iron stores were unchanged. However the study concluded that drumstick leaves being a locally available food must be utilised more effectively instead of the relying on supplements and fortified food for the essential nutrients.Further study conducted by Tete-BénissanAmivi et al. (2012) on the effect of *Moringa oleifera* on their hemogram profiles concluded that *Moringa oleifera* is capable of correcting the moderate iron deficiency anaemia and may be regarded as an effective nutritional supplement and would allow improvement of nutritional status.

Pre and post test heamatological variables HB, RBC, HCT, MCV, MCH, MCHC were shown in table 2. Given normal heamoglobin levels in the test groups between 10.43±0.89 and 0.87 g/dL, the average rate of Hb shown in the table above probably reflects anemia among those individuals studied during the period of study. These observations in the present study comparable with the findings of zongo et al., (2013), who have reported that the group receiving morning supplement was recorded higher average weight gain, quicker anemic recovery rate and significant increase in HB rate. Zongo et al., reported that evolution of the clinical forms of malnutrition was more rapid and very propounced in the study groups. This can be explained by nutritional properties (Yameogo et al., 2011; Zongo et al., 2013) and pharmacological properties of *Moringa oleifera* leaves and can be used either for prevention and correction of malnutrition, or to reduce oxidative stress and inflammatory reactions (Tete- Benissan amivi et al., 2012). In the present study supplementation with moringa leaf poriyal in post test results reveals significant increase in HB, RBc, HCT (%), MCV *FF1), MCH (Pg) and MCHC *g/dL) levels. N dong et al., (2007) have reported that the addition of large quantities of moringa could increase the value of iron present, Beta-cavotene rich moriaf leaves can thus be an important source of vitamin A, can be used for reloading the bound iron status and thus, help in reducing anemia as well as prevalence of vitamin a deficiency. The mineral composition of leaves unavals a high concentration of iron and calcium children and women of reproductive age group and pregnant women are most vulnerable to micro nutrient deficiencyand anemia, *Moringa oleifera* leaves poriyal supplementation can be used either for prevention and correction of malnutrition anaemia in the rural population. Reducing anaemia is recognized as an important component of the health of women and children, as the second global nutrition target for 2025 calls for a 50% reduction of anaemia in women of reproductive age WHO (2014). In low-income countries, the prevalence of anaemia remains high and is an area of priority. If the current trends are

maintained Branca et al.(2013) there is a probability of less than 25% in all regions of reaching the global target of reducing the prevalence of anaemia by 50% in women of reproductive age.

There are many varieties of green leafy vegetables, which are rich in antioxidants and other essential micronutrients, but they are discarded and are not used for human consumption. Drumstick (*Moringa oleifera*) leaves are one of them, which are available at no cost and are very rich in all the micronutrients (Kushwaha and Chawla, 2015)

4.CONCLUSION

Anemia remains a very common health problem among the women of reproductive age group and leads to high morbidity and mortality rates among females. Most of the women have poor knowledge regarding anemia, its cause, prevention and management. Freshly blanched drumstick leaves showed a mild positive relationship in the improvement of anemia. The present study shows that the haemoglobin levels of the women inreproductive age group showed a significant improvement post intervention withdrumstick leaves poriyal This may be promoted in the community as a prophylactic and a dietary supplementation inanaemic women.

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