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Effect of nutritional Intervention on hemoglobin levels and diet pattern of adolescents involved in agricultural and allied activities.

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Abstract: *Adolescence (10-19) years are considered vulnerable to anemia because of increased iron requirements related to rapid growth and menstrual loss which severely impairs the physical and mental development. During problem identification survey in the village, adolescents highlighted fatigue, body pains and weakness as the general prevailing problems among them. Adolescent girls were tested for Hb levels and once ascertained with low Hb levels, an intervention programme as frontline demonstration was proposed by Krishi Vigyan Kendra, Mamnoor, Warangal District. Telangana. The aim of the study was to assess the impact of intervention on anemia and diet pattern of adolescents. Purposive method was followed in selection of 15 adolescent girls from 2 villages in the age range of 17 to 19 years whose Hb levels were less than 12 gm/dl. Subjects comprised from low socio economic group working as seasonal agricultural laboures involved in crop harvest activities. At the time of pre-intervention the subjects were well informed about the nature of the study and a verbal consent was sought to carryout survey and blood test to access the Hb levels. Hemoglobin meter was used by trained auxiliary midwifery in examining the Hb levels. Diet Patten was assessed by food consumption format and one day recall method.Intervention used was supplementation of Ragi laddu of 65gm each @ 2 per day for a period of 12 week to the subjects. Nutrition education programme on importance of balance diet, and low cost recipes demonstration was also included in the intervention programme. Post intervention assessment was done in the same manner as pre intervention.*

Key words: *hemoglobin, supplementary nutrition, Adolescent*

Introduction

Adolescents as described by the United Nations (2000) as those between the ages of 10 and 19, are 1.2 billion in number in world today, constituting 18 percent of the world's population. More than half of all adolescents live in Asia. In absolute numbers, India is home to more adolescents- around 243 million-than any other country. Adolescents are the future generation of any country and their nutritional needs are critical for the well being of society. Adolescent girls are more vulnerable to anemia because of increased iron requirements related to rapid growth and menstrual loss and also inadequate dietary intake resulting in deficiency of nutrients especially iron. Prevalence of anemia among girls (Hb<12gm/dl) is alarmingly high. As per the reports of National Family Health Survey-3 (2005-2006) Ministry of Family

Welfare, Government of India, 56 percent of Indian adolescent girls are anemic.

Inadequate nutrition during adolescence can have serious consequences through out the reproductive life and beyond. Very often, in India girls get married and pregnant even before the growth period is over, thus doubling the risk for anemia (Chaterjee, 2008). A high prevalence of anemia among adolescent girls was found, with higher low economic strata. It was seen that anemia affects overall nutritional status of adolescent girls. The problems of adolescents are multi dimensional in nature and requires holistic approach. Some of the problems faced by adolescents are anorexia nervosa, micronutrient deficiency, emotional problems, behavioral problems, substance abuse, identity and academic problems (Siddharam et.al 2011). Extensive studies on anemia reported that prevention of both iron deficiency and anemia requires measures that increase iron intake through food based approaches, namely dietary diversification and food fortification with iron, iron supplementation and improved health services and sanitation. Hence present study aims to accesses the effect of nutritional Intervention on hemoglobin levels and diet pattern of adolescents girls involved in agricultural and allied activities through a front line demonstration.

Materials and Methods

Study Area: Two villages namely Mamnoor and Singaram from Warangal district of Telangana were selected.

Study subject: Adolescent girls of 17-19 years who were actively involved in agriculture and allied activities, and whose hemoglobin levels were less than 12mg/dl were selected.

Subjects size and sampling technique: Present study included 15 adolescent girls purposively selected from two villages. The criteria for the selection of subjects included 1. The subjects are native of the village, 2.With no major health complications and no history of chronic disease, 3. Are school dropouts and have been involved in agriculture and allied activities for a year.

Data collection: The study was carried out during 2014-2015 as a front line demonstration by K.V.K. Mamnoor, Warangal District of Telangana. Help from Anganwadi workers is taken in identification of adolescents and in organizing a get-together with their parents. Investigator contacted subjects and their mothers personally and the objective and nature of the study was explained and a verbal consent was sought to carryout survey and blood test to access the Hb levels. Help from Auxiliary Midwifery was sought in accessing the Hb levels during pre and post intervention. Hemoglobin estimation was obtained by cyan method (2003). The severity of anemia was classified on the basis of WHO (2003) classification i. e. Hb<7gm/dl - severe anemia, Hb 7-10gm/dl- moderate anemia, Hb10-12gm/dl - mild anemia' Hb>12gm/dl - non anemic. A semi structured interview schedule was administered to study the subjects and the responses were recorded by the investigator. The questionnaire included the age, religion, family income, self earnings, history of illness, type of family, food habits and health information such as clinical signs of anemia height and weight of the subjects were included. To assess the dietary intake 24 hours recall method format and

food consumption checklist were used to know portion consumption and frequency of usage of the varied food items over a period of time. Post intervention assessment was carried out in the same manner as pre intervention.

Intervention: Nutrition intervention included two components 1.Supplimentation of nutritive diet and 2. Nutrition education.

1. **Intervention 1- Supplementation of Ragi Laddu :** Low cost nutrient rich Ragi laddu of 65 gm each with a composition of 30gm Ragi, 20gm jaggery, 10 gm of peanut and 5gm of ghee was used as nutritional intervention. Nutrient composition of Ragi laddu each of 65gm consisted 119.51mg of calcium, 4.92gm of proteins, and 1.5mg of iron. The selected subjects of adolescent girls were provided with 2 laddus each day for a period of 12 weeks and tested for Hb levels.

Method of preparation of Ragi Laddu: Stones and dust were removed from ragi and were washed thoroughly. Ragi were soaked in water overnight and then tied into a cotton cloth for sprouting. In a day the sprouted ragi were sundried thoroughly and grinded ground in to powder. Grinded ragi powder was roasted in with little fat or oil for few minutes and added to roasted peanut powder and elichi powder for aroma. Once the jaggery was set to boiling temperature i.e. little less of one thread consistency, the ragi mixture is added to the syrup and round balls (laddus) were made when the mixture is still hot.

Intervention 2 - Nutrition education: Apart from nutrition intervention 1 i.e. supplementation of ragi laddu, nutrition education on importance of nutrients, balanced diet, recommended dietary allowances, demonstration of low cost nutritive recipes, and mitigation of nutrient loss during cooking process, personal hygiene and sanitation was imparted to the subjects.

Data analysis: The SPSS software was used for the analysis of the data.

The subjects selected constituted in the age range of 17-19 years and were found moderately anemic with Hb levels 7> 9 mg/dl. These adolescents were school dropouts involved in as seasonal agricultural laboures involved in crop harvest activities and their parents were also unskilled agricultural labourers. Subjects belonged to nuclear families with an average family size comprised of 5 members and were from low socio economic group working with an average family income of Rs. < 1, 50, 000 per annum and the individual income of the subjects ranged from Rs. 10,000 -15,000 per annum.

Table1 reveals that the selected subjects were moderately anemic at pre intervention period, while an improvement of 1/gm/dl Hb level was observed at post intervention. With the improvement in Hb levels majority of the subjects slide from moderate anemic to mild anemic condition.

Table 1: Heamoglobin levels of adolescent girls before and after supplementation

Hemoglobin levels gm/dl			
Age in years	Number of subjects	Before supplementation	After Supplementation
17-18	7	8-9	10-12
18-19	8	7-8	9-10

The reasons for high incidence of anemia among the adolescents girls are increased iron requirements because of growth, menstrual loss, discrepancy between high iron need for hemoglobin formation and low intake of iron containing food, erratic eating habits, dislike for foods which are rich in iron like given leafy vegetables and iron absorption inhibition in food.

Results clearly indicated that intervention programme had positive effect on the hemoglobin levels of the subjects. The subjects reported off the general fatigue, physical pain and body aches during pre intervention period and the same were reduced and were feeling much better and active after the supplementation programme. Adequate calcium, protein and iron requirements provided by the Ragi laddu on regular basis might have helped in the enhancement of Hb level and improvement in physical health among adolescents.

Intake of diet

One day recall method revealed that majority, 80% of the subjects were non vegetarians while 20% were reported to be vegetarians by choice. However, egg was reported to be consumed by all. With regard to frequency of having meals 79% of them had 3 meals a day while 21% of them reported of having just 2 meals a day. Snack item in their diet was absolutely missing. However, all the subjects reported of having tea twice in a day. Ranganath (2015), also reported that majority of the girls in rural areas are skipping breakfast and consuming tea and coffee. Interestingly, it was observed that the subjects who are involved regularly in the agricultural activities were having 3 meals a day while the subjects who were not regularly involved in agricultural operations were having only 2 meals a day and observations further revealed that the subjects having only 2 meals a day had hemoglobin levels less than < 8 mg/dl. The reasons reported by 50% of the subjects were heart rendering; they expressed felling of guilt in having 3 meals a day, for just being idle at home and non contributing to family income. They even reported that the family members especially siblings criticize them of their economic inactiveness. Noteworthy reasons expressed by the adolescent girls for their in activeness was their inability to take the physical strain and quiet often prone to fever and stress if they were on regular go. Others have expressed that the nature of work in agriculture fields did not suit them as they were more sensitive and got fatigue easily. All the above mentioned reasons clearly indicated their poor health status and lack of awareness on importance of nutrition.

The consumption pattern of foods per day by the subjects revealed that the consumption of pulses, green leafy vegetables, and meat and milk products was just 50% to the RDA by the adolescents. Sugar and oil were consumed in adequate quantities. Only cereal consumption was meeting 80% of RDA that too consuming mainly rice. One portion of pulses and one portion of milk was reported to be consumed while, 2 portions of pulses and 3 portions of milk was recommend respectively. Roots & tubers and green leafy vegetables were consumed ½ portions while one portion is recommended. Majority(80%) of the subjects had no fruit in their diets . Majority of the subject's plate meal concentrated with rice approximately of about 150gm of cooked rice 30gm of cooked pulses, 20 gm of cooked vegetables and 5-10gm of pickles or chutney made of some vegetables. Consumption of milk products like curds or buttermilk was completely absent in their diets. Consumption of adequate fat in the diet might be because of the feeling that more of oil in preparation of vegetables and curries enhances its taste. Another reason might be because of the absence of snack item in the daily meal pattern , most of them reported that when they feel hungry in the evening they prefer to buy some out side food like oil fried eateries (mirchi bajji, samosa, chat items which are locally available) snack food to meet the hunger. Similarly consumption of sugar with1/3 portion of milk in tea might be the reason for its adequacy.

Observations at household level revealed that the table spoons (10-15 gms) capacity were used as serving spoons for vegetables and other curries. This indicated the ignorance of the subjects and their family members on essential portion consumption. Another reason also reported by the subjects was the silent discrimination of girls observed at family level by mothers with regard to portion serving of vegetables, curries or meat items preferably to the male members of the family.

Food consumption check list revealed that cereal, pulses, oil and milk products were consumed daily, while roots and tubes were consumed once in a week which included only potato and colocasia. Green leafy vegetables and meat products fared up once in a week consumption list, fruits were occasionally consumed and consumption of millets was almost negligible in their diet. Interestingly adolescent girls have reported to consume all kinds of vegetables such as brinjal, ladies finger, karela, peas, beans ,tamato etc. which were available every day and are commonly available in the market. Most of the meat products consumed by the subjects included chicken compared to mutton and fish once in a month or only during festivals. Egg was found to be consumed twice in a week.

At post intervention a notable difference in the consumption of food items was observed among adolescents. Majority of the adolescents have shown interest in having breakfast made of cereal and pulses combination. Inclusion of fruits twice in a week was noted which was earlier neglected as a decorative or dessert item. Post intervention, it was observed that millets like Ragi, Jowar were included in their weekly diet. Traditional snack items made of whole grams of bengal, black gram, chickpea, maize and ground nut were prepared at home which were missing in the diet pattern at pre intervention. This might be because of the improvement in

awareness on importance of snack item in their diets and also the advantage of usage of millets. Another reason could be that the millets are more suitable in making traditional snack items. Mothers also expressed satisfaction over inclusion of snacks in their diet and also interested in revival of the local traditional recipes.

Conclusion and recommendations

Improvement in the Hb levels clearly indicated the positive effects of nutritional intervention. The study reveals poor awareness levels among adolescent families with regard to nutritional requirements, their availability and portion consumption for maintaining of the health. Though there might be various factors that contribute to the prevalence of low Hb levels, but the present intervention has helped to narrow down this major health problems through intervention of nutrition diet and nutrition education. Effectiveness of the nutrition intervention proves that there is an urgent need of nutrition education among the adolescents for their better future and healthy nation. Therefore Government and NGOs working for adolescents need to focus on nutritional education supplementation programmes for reducing micro nutrient mal nutrition among adolescents.

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