DOI : 10.5958/2349-4433.2024.00098.3

J Krishi Vigyan 2024, 12(3) : 556-559

Impact of *Moringa* Leaf Powder on Tribal Malnourished Adolescent Girls' Health

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ABSTRACT

Moringa oleifera which widely used as vegetable in various part of world, is considered good not only in terms of taste but in health also as it contains eight essential Amino acids and eighteen other amino acids required for the normal growth and development. Its antibacterial properties can protect us against various infections. Anaemia is a widely prevalent health problem among adolescent girls which is defined as low level of haemoglobin in the blood, mainly due to the iron deficiency. The study has been planned to highlight the impact of administration of *Moringa oleifera* leaves in malnourished adolescent girls and the socio demographic factors related to anaemia during 2020-21 in village Sultanpur of Harda district. *Moringa* leaf powder 20 g was incorporated in the daily diet of anaemic adolescent girls for the period of three months. A biochemical test (haemoglobin level) was done after the intervention. The positive impact of *Moringa* was found after intervention that the average Hb level was increased from 10.8 mg/dl to 11.9 g/dl which shows 1.1% enhancement in Hb and BMI was also increased from 17.7 to 18.3.

Key Words: Adolescent girls, Anaemia, Malnutrition, Moringa Leaf Powder, Tribal.

INTRODUCTION

Moringa oleifera Lam. is a multipurpose and exceptionally nutritious vegetable tree with a variety of potential uses (Jeevitha and Sujatha, 2017). The beans, leaves and flowers of *Moringa* are edible and is considered good not only in terms of taste but also in health. Its leaves, fruits, oil, juice, roots, bark, seeds, beans/pods and flowers have medicinal values. *Moringa* leaves contain elements such as Vitamin D, Vitamin C, Vitamin E, Iron, Magnesium, Potassium and Zinc. It is commonly said that *Moringa* leaves contain more Vitamin A than carrots, more calcium than milk, more iron than spinach, more Vitamin C than oranges, and more potassium than bananas", and that the protein quality of *Moringa* leaves rivals that of milk and eggs. *Moringa* leaves are also rich sources of flavanols such as kaempferol and 3'-O Mequercetin (Francis and Amos, 2009).

Adolescence is a significant period of growth and maturation. The World Health Organization (WHO) defines an adolescent as any person between age 10 and 19 year. Adolescent girls are backbone of healthy and progressive family and thus future builders of positive health of community. In today's era adolescent girls are facing many health problems: in that Anaemia is the most prominent one due to their life style modifications like eating junk food, snacking, skipping meals, etc. (Choudhary *et al*, 2020).

In rural Madhya Pradesh, over 58 percent of adolescent girls (aged 15-19 years) suffer from anaemia. 63% population of non-pregnant women age 15-49 years are anaemic and 69.4% women age 15-19 years are anaemic in Harda District of Madhya Pradesh (District Fact Sheet, National Family Health Survey (NFHS-5, 2019-21). The tribals of Madhya Pradesh largely depend on forest produce as their food for livelihood, but the civilization and development process have gradually invaded the forest area, depriving tribal community of their means of existence confronting them to poverty, food insecurity, poor health and malnutrition. Dietary Intake and food habits play a key role in determining the nutritional

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Table 1. Nutrient Content and Shelf Life of *Moringa* Leaf Powder (MLP).

Sr. No.	Test Parameter	Amount (Per 100g)
1.	Energy Value (Kcal)	588
2.	Moisture (gm)	7.00
3.	Protein (gm)	24.16
4.	Iron (mg)	25.9
5.	Calcium (mg)	3900
6.	Vitamin C (mg)	182.5
7.	Vitamin A (mcg)	3413

status whereas inadequate nutrition is responsible for the health problems that may arise due to consumption of unbalanced diet (Bathla *et al*, 2018)

MATERIALS AND METHODS

The study was planned to highlight the burden of anaemia in malnourished adolescent girls and to study the socio demographic factors related to anaemia as it may be helpful further to reduce the associated morbidities by required interventions. The present study was carried out on 20 malnourished adolescent girls aged 13 to 15, in Sultanpur village of Harda block of Harda District during 2020–21 for three months to evaluate the effect of consumption of *moringa* leaf powder along with regular diet and nutrition education. *Moringa* leaf powder was given to them and the processing method of making *moringa* leaf powder was also taught to the respondents i.e. Collecting the leaves, washing, drying in shed, Grinding and then Storage of *moringa* powder so that they could incorporate it in their diet in future. The sample size was estimated on the basis of anaemia prevalence amongst adolescent girls with allowable error of 10%. The anaemic adolescent girls were randomly selected on the basis of the survey carried out with the help of local *Anganwadi* workers. The basis of classifying the adolescent girls as malnourished was their dietary habit and 24-hour diet recall.

The height and weight of the subjects were measured using standard techniques before and after the study. The haemoglobin level amongst these selected malnourished adolescent girls was estimated with the help of haemoglobin colour scale developed by World Health Organization (WHO) which simple, inexpensive clinical devise for diagnosing anaemia. Pre and post evaluation was done to find out the impact of *Moringa* leaf powder on malnourished adolescent girls with the help of questionnaire and observations taken during the study.

RESULT AND DISCUSSION

Dry *moringa* leaves powder a mild positive relationship in the improvement of anaemia. The haemoglobin levels of the adolescence showed a significant improvement post intervention with *moringa* leaves powder. This may be promoted in the community as a dietary supplementation in anaemic girls. After supplementation of 20 g of *moringa* leaves powder approximate Energy 196 Kcal., Protein 7.2 gm, Calcium 1170 mg, Iron 7.7 mg, vitamin C 54.7 mg and Vitamin A 1023.9 mcg extra nutrients are consumed by the adolescence girls. Table-1 shows higher content of protein and iron in *moringa* leaf powder supplemented to adolescent girls under study.

Moringa leaves powder which was included in the daily diet of the tribal adolescent girls for the period of three months, helped them to get rid of from malnutrition and anaemia as it supplemented 19.6 kcal energy, 7.2g protein, 7.7g iron and 1.17g calcium per day (Table 2) to the girls under study over control where no energy source was included.

The Assessment of Anthropometric data shows (Table 3) after conducting Pre and Post intervention among the 20 anaemic tribal adolescence girl age between 13-15 for the period of 90 days the average weight was increased from 43 kg to 44.6 kg respectively. In case of height no

significant observation was found as it noted to be 156 cm before and after intervention. Body mass index (BMI) was calculated using formula weight (kg) and height (in m^2) before intervention it was 17.7 and after intervention it was recorded 18.3 (Table 3). Another research study showed that giving MoLP a dose of 500 mg for 14 days had a significant effect (P value = 0.000) on increasing Hb levels in adolescent girls. Before the intervention, respondents with mild anaemia were 90% and those with moderate anaemia were 10%, after the intervention, respondents with mild anaemia were 33%, and respondents with normal Hb levels were 67% (Kurniawati *et al*, 2018)

According to the World Health Organisation (WHO) /UNICEF, the estimated level of haemoglobin (Hb) for mild, moderate, and severe anaemia in adolescent girls are:

CONCLUSION

The findings of the current study demonstrated the benefits of giving malnourished adolescent girls powdered *Moringa oleifera* leaf. The blood haemoglobin percentage of the malnourished adolescent girls showed a notable improvement. Additionally, the BMI improved, indicating that *moringa* leaf powder is highly beneficial in enhancing the malnourished adolescent girls' health.

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Received on 15/6/2024 Accepted on 20/8/2024