



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

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Table 2. Incorporation of *Moringa* Leaf Powder in daily diet of the Respondents.

Detail of Technology	Per capita Consumption (g/day)	Nutrient Intake (Unit)			
		Energy (kcal)	Protein (g)	Iron (mg)	Calcium (mg)
Control group	Not taking MLP in daily diet	-	-	-	-
Intervention group	20 g per day with daily diet	19.6	7.2	7.7	1.17

Table 3. Mean Anthropometric Measurements of Respondents.

Anthropometric parameters	Before intervention (Mean)	After intervention (Mean)
Height (cm)	156	156.1
Weight (kg)	43	44.6
BMI (kg/m ²)	17.7	18.3

Table 4. Biochemical Assessment of the Respondents.

Biochemical Analysis (gm/dl)	Normal (gm/dl)	Before Intervention (gm/dl)	After Intervention (gm/dl)
Haemoglobin	12-16	10.8	11.9

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 m²) 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:

- Mild anaemia: Hb level of >11 g/dl. and < 11.9 g/dl.
- Moderate anaemia: Hb level of >8 g/dl. and <10.9 g/dL

- Severe anaemia: Hb level of less than <8 g/dL
- A haemoglobin level of 12 g/dL or higher is considered normal.

The normal Hb level for Adolescent girls is 12 to 16 g/dL. When the haemoglobin level is low, the patient has *anaemia*. An *erythrocytosis* is the consequence of too many red cells; this results in haemoglobin levels above normal.

It was observed that after the supplementation of *moringa* leaf powder, an increase of 1.1 g/dl was noted after 90 days the average of Hb (mean) over intervention which 10.80 g/dl (Table 4). These results indicated a significant difference between Hb before and after the intervention. The supplementation of *moringa* leaf powder appears to be effective in improving the anaemia in adolescent girls. A research study showed that giving MoLP a dose of 25 mg for 3 months had a positive relationship to increase Hb levels in adolescent girls by 1.4 g/dL (Choudhary *et al*, (2020)

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.

REFERENCES

- Annalakshmi S (2021). Integrative Review on Nutritional Dynamite for Anemia of Adolescent Girls. *Asian J Pharma Res Dev* **9(6)**:80-83.
- Bathla S, Sharma M and Renu Bala (2018). Assessment of Food Habits and Dietary Intake of Rural Women. *J Krishi Vigyan* **7(1)**: 25-29.
- Choudhary M, Singh S P and Patel C R (2020). Effect of drumstick leaves supplementation for treating iron deficiency anemia in adolescence girls. *J Pharma Phyto* **9(3)**: 1446-1449.
- Chrysholite Jenisha C and Rajitha S R (2018). Effectiveness of drumstick leaves soup on hemoglobin level among antenatal mothers. *Int J Medical & Health Res* **4(11)**: 43-49.
- Deepa R, Dyana P, Gayathri S, Gowri C, Gokulraj S and Deenadayaal V (2020). Drumstick leaves soup on level of Hemoglobin. *Int J Nur & Edu Res* **8(2)**:161-165.
- Fentie, Kelemu, Wakayo, Tolassa and Gizaw, Getu (2020). Prevalence of Anemia and Associated Factors among Secondary School Adolescent Girls in Jimma Town, Oromia Regional State, Southwest Ethiopia, *Anaemia*, 2020, 5043646, 11 pages.
<https://doi.org/10.1155/2020/5043646>
- Francis K A and Amos B (2009). Effectiveness of *Moringa oleifera* seed as coagulant for water purification. *African J Agric Res* **4(1)**:119-123.
- International Institute for Population Sciences (IIPS) and ICF. 2021. National Family Health Survey (NFHS-5), 2019-21: India: Volume I. and State Fact Sheet, Madhya Pradesh, Mumbai: IIPS.
- Jeevitha A and Sujatha R (2017). Effectiveness of moringa leaves extract on hemoglobin level among adolescent girls with anemia in selected schools at Mangalore. *Int J Recent Sci Res* **8(12)**: 22407-22409.
- Joshi P and Mehta D (2010). Effect of dehydration on the nutritive value of drumstick leaves. *J Meta System bio* **1(1)**: 5-9.
- K Spandana Deepika and R Geetha Reddy (2018). Nutritional Awareness among Adolescent Girls in Mahabubnagar District in Telangana. *J Krishi Vigyan* **7(Special Issue)**: 107-110.
- Kurniawati I, Fitriyya M and Wijayanti W (2018). Karakteristik tepung daun kelor dengan metode pengeringan sinar matahari. Prosiding Seminar Nasional Unimus, Semarang. **1(1)**:238-243.
- Mishra S P, Singh P and Singh S (2012). Processing of *Moringa oleifera* leaves for human consumption. *Environ Pharma & Life Sci Bulletin* **2(1)**:28-31.
- WHO (2011). Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization, 2011 (WHO/NMH/NHD/MNM/11.1)

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