

## Heamo Bite Lozenges: An Innovation to Kill the Iron Deficiency

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### ABSTRACT

Anaemia is a global public health problem affecting both developing and developed countries at all ages. According to the World Health Organization (WHO), anaemia is defined as haemoglobin (Hb) levels <12.0 g/dL in women and <13.0 g/dL in men. Anaemia occurs when there are not enough healthy red blood cells to carry oxygen to your body's organs. There are many different types of anaemia, but the most common type is iron-deficiency anaemia. According to the WHO iron deficiency is the top nutritional disorder in the world. In India more than 600 million people suffer with this deficiency especially in the children and female. Moringa leaves are good source of iron but not used in daily meal. So, herbal lozenges containing Moringa leaves and Amala fruit are formulated as ascorbic acid from Amla helps absorption of iron from leaf.

**Key Words:** Herbal lozenges, Iron deficiency, Moringa, Amala, Anaemia

### I RESEARCH PROBLEM AND MOTIVATION FOR THE WORK

- (a) As per WHO, iron deficiency is the top nutritional disorder in the world. In India more than 600 million people suffer with this deficiency especially in the children and female. (Fig No. 1)
- (b) Oral iron supplements offer a more robust avenue for iron repletion. The most prescribed preparation are the ferrous salts, include ferrous sulphate, ferrous gluconate, and ferrous fumarate. These ferrous (Fe+2) forms are more soluble than the dietary ferric (Fe+3) form. But oral iron therapy is notorious for its side effects, namely constipation, diarrhoea, heartburn, nausea, and epigastric pain, which may plague up to 20% of patients and limit compliance to the different iron formulations.
- (c) Particularly in children drop out ration is higher due to taste and difficulty in swallowing.
- (d) There are two main types of iron in the diet, absorbed through different pathways in the small intestine. Heme iron derived from hemoglobin and myoglobin is found in meat, fish, and poultry, and while heme iron only contributes ~ 10–15% of dietary iron intake, ~ 15–35% of heme iron is absorbed.
- (e) Relatively few dietary factors impact on heme iron absorption. Meat and soy protein have been shown to enhance heme iron absorption, Heme iron is converted to nonheme iron if meat is cooked for a long period of time at too high a temperature.
- (f) The majority of dietary iron is from nonheme iron found not only in meat, fish, and poultry but also in cereals, pulses, legumes, nuts, seeds, eggs, and some vegetables. Only 2–20% of nonheme iron is absorbed by the body, and absorption of nonheme iron is affected by a number of factors.
- (g) Dietary factors enhancing nonheme iron absorption act by converting the insoluble ferric form of iron (Fe<sup>3+</sup>) to the more soluble ferrous form (Fe<sup>2+</sup>) or

by maintaining the iron released from food during digestion in a soluble form prior to entering the intestinal cell. Vitamin C is a strong enhancer of nonheme iron absorption. Dietary factors enhancing nonheme iron absorption act by converting the insoluble ferric form of iron (Fe<sup>3+</sup>) to the more soluble ferrous form (Fe<sup>2+</sup>) or by maintaining the iron released from food during digestion in a soluble form prior to entering the intestinal cell. Vitamin C is a strong enhancer of nonheme iron absorption.

- (h) Lots of Moringa and Amla trees are cultivated at Ganpat University campus having good amount of nonheme iron in moringa and vitamin C in Amla are the motivational factors for this project.

### II BACKGROUND AND RELATED WORK

- (a) Gopalakrishnan and team have reviewed and reported the amount of minerals and nutrition supplements present in moringa plants showing highest amount of iron in dry leaf powder among all parts of plant. (Table:1)<sup>1</sup>
- (b) Idohou-Dossou conducted a randomized study to test the efficacy of Moringa powder on iron status and weight gain in women and found Moringa Oleifera is one example of local food that can be used in nutritional intervention program, but its use needs additional rigorous clinical trials to confirm its nutritional benefits.<sup>2</sup> In another study it was found that Moringa oleifera leaf extracts can be useful in preventing maternal anaemia and low-birth-weight.<sup>3</sup>
- (c) While Gallaher et al had reported that Iron bioavailability from *Moringa oleifera* leaves is very low.<sup>4</sup>
- (d) Lynch et al studied the interaction of iron and ascorbic acid and found that Ascorbic acid is a powerful enhancer of nonheme iron absorption and can reverse the inhibiting effect of such substances as tea and calcium/phosphate.<sup>5</sup> the same is supported by Hallberg and team.<sup>6</sup>

(e) Alkandari and co-workers evaluated fresh amla, sun-dried, oven-dried and freeze-dried amla for ascorbic acid content and found to have 6644.305 mg/100g,

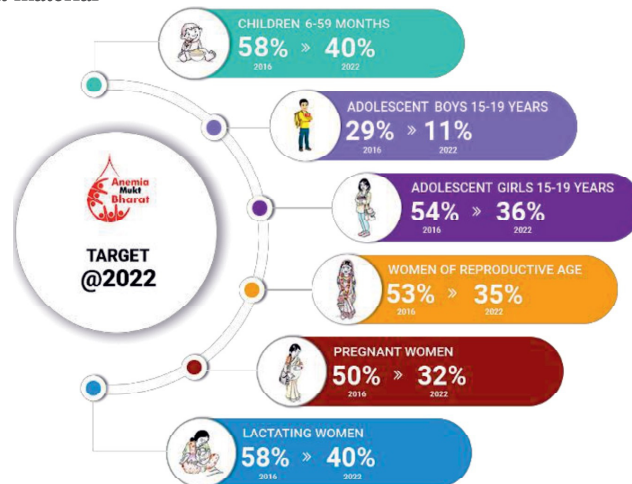
748.427mg/100g, 641.364 mg/100 g, 791.233 mg/100 g, respectively.<sup>7</sup>

### III DIAGRAMS AND FIGURES

**Table 1**  
The nutrient compositions of leaves, leaf powder, seeds and pods.

Nutrients	Fresh leaves	Dry leaves	Leaf powder	Seed	Pods
Calories (cal)	92	329	205	—	26
Protein (g)	6.7	29.4	27.1	35.97 ± 0.19	2.5
Fat (g)	1.7	5.2	2.3	38.67 ± 0.03	0.1
Carbohydrate (g)	12.5	41.2	38.2	8.67 ± 0.12	3.7
Fibre (g)	0.9	12.5	19.2	2.87 ± 0.03	4.8
Vitamin B1 (mg)	0.06	2.02	2.64	0.05	0.05
Vitamin B2 (mg)	0.05	21.3	20.5	0.06	0.07
Vitamin B3 (mg)	0.8	7.6	8.2	0.2	0.2
Vitamin C (mg)	220	15.8	17.3	4.5 ± 0.17	120
Vitamin E (mg)	448	10.8	113	751.67 ± 4.41	—
Calcium (mg)	440	2185	2003	45	30
Magnesium (mg)	42	448	368	635 ± 8.66	24
Phosphorus (mg)	70	252	204	75	110
Potassium (mg)	259	1236	1324	—	259
Copper (mg)	0.07	0.49	0.57	5.20 ± 0.15	3.1
Iron (mg)	0.85	25.6	28.2	—	5.3
Sulphur (mg)	—	—	870	0.05	137

All values are in 100 g per plant material



Baseline figures have been taken from NFHS4

#### IV RESULTS AND CONTRIBUTIONS

- (a) The lozenges from Moringa (Rich source of Iron) and Amla (Source of Ascorbic acid) are developed by melting and mold technique.
- (b) Lozenges are more suitable than tablets or syrup in children. The black pepper is also added as bioavailability enhancer and taste enhancer.
- (c) The developed formulation was evaluated for organoleptic characteristics and sensory parameters by students and found tasty and healthy.
- (d) The developed lozenges will be also evaluated for effect on Haemoglobin content in female students.
- (e) The developed formulation may contribute a lot in Anemia mukt Bharat mission of government of India.

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