

## Efficacy of *Moringa oleifera* leaf extract for the treatment of Anemia in girls

### Abstract:

The *Moringa oleifera* has proven to be an ancient medicine for for anemia, skin infections, blackheads, anxiety, and pimples, for intestinal worms, lactation, diabetes and pregnancy. Green leafy vegetables and fruits provide much needed essential micronutrients. Moringa leaves in particular are a rich, inexpensive source of micronutrients. In teenage girls a large number of hormonal changes are witnessed and due to the change in diet which lacks the intake of leafy vegetables and fruits that are essential, a large number of anemic cases are observed. To overcome this problems moringa *oleifera* leaves extract was formulated. 10 girls of the age group ranging between 17-21 years were selected and their haematological investigation was done. Oral administration of this extract was continued for over a month to these girls. After a month haematological investigation were repeated. Haemoglobin of the moringa extract treated group when compared with the before treatment group were , found out to be increased due to the phytochemical constituents in the extract and also presence of minerals and vitamins.

**Comment [A1]:** I recommend writing the design of the experiment used

**Key words:** Anemia, Haemoglobin *Moringa oleifera*, teenage.

**Comment [A2]:** Separate with a comma

### Introduction:

The *Moringa oleifera* is belongs to the family Moringaceae and is commonly called as drumstick tree. *Moringa oleifera* is found in all the tropical countries (5). Green leafy vegetables and fruits provide much needed essential micronutrients like beta-carotene [vitamin A], vitamin C, folic acid, and also calcium and potassium. Moringa leaves in particular are a rich, inexpensive source of micronutrients (4). Moringa as a tool shows great ability to help overcome some of the most severe problems in the developing countries like that of malnutrition, deforestation, impure water and poverty. The tree grows best in the dry regions where these problems are worst.

**Comment [A3]:** I recommend placing the classifier of the botanical species

**Comment [A4]:** I recommend *M. oleifera*

**Comment [A5]:** I recommend deleting the phrase, "essential" implies being "very necessary" or "much needed"

**Comment [A6]:** I recommend eliminating

Every part of the Moringa tree is said to have beneficial properties that can serve humanity. People in various societies around the world have made use of these properties. It is known that moringa's fresh leaves contain vitamin C seven times more than oranges, vitamin A four times more than carrots, calcium four times more than milk, potassium three times more than bananas and protein two times more than yogurts (7). Moringa has been used as a traditional medicine around the world, for anemia, skin infections,

blackheads, anxiety, bronchitis, catarrh, chest congestion, asthma, blood impurities, cholera, glandular, swelling, headaches, conjunctivitis, cough, diarrhea, eye and ear infections, fever, abnormal blood pressure, hysteria, pain in joints, pimples, psoriasis, respiratory disorders, scurvy, semen deficiency, sore throat, sprain, tuberculosis, for intestinal worms, lactation, diabetes and pregnancy. The healing properties of Moringa oil have been documented by ancient cultures. Moringa oil has tremendous cosmetic value and is used in body and hair care as a moisturizer and skin conditioner. Moringa oil has been used in skin preparations and ointments since Egyptian times. The focus of this study is on the leaves, but other parts of the tree are also creditable of further study.

**Comment [A7]:** I recommend "However, the focus of this study is on the leaves, but other parts of the tree are also creditable of further study"

Moringa leaves have been used in the traditional medicine passed down for centuries in many cultures. Now they have also attracted interest in the modern scientific community. In the recent past, more than 750 studies, articles and other publications have included Moringa. However, most of the studies are either nutritional analyses or laboratory studies with animals. There are very few studies of the effects on human beings. This study intends to overcome the anemic condition of girls of the specific age group by using moringa leaves. This specific group includes girls in between 17 – 21 years of age. During this age a large number of hormonal changes are witnessed in girls and due to the life style (diet) a large number of anemic cases are observed.

**Comment [A8]:** I recommend deleting sentence

## Materials and Methods:

### Leaf Harvesting:

The moringa leaves were harvested from the Shelke vasti, Vaijapur. Both young and old leaves are suitable for preparing the dried leaf powder. The moringa leaves harvested at morning or evening.

**Comment [A9]:** Do old and young leaves contain the same concentration of compounds? Wouldn't the older leaves be better?

**Comment [A10]:** I recommend explaining a little more. The way to collect the leaves is essential.

### Selection of healthy leaves

Diseased and damaged leaves are discarded manually just after the collection of fresh leaves.

### Washing

Collected leaves are washed in running tap water till the removal of dirt. After this, leaves are soaked in 1% saline solution (NaCl) for 5 minutes to remove microbes. Leaves are further washed with 70 % ethanol followed by twice washing with distilled water. This step plays a substantial role in removal of dust, pathogens as well as microbes present on the leaf surface.

**Comment [A11]:** I recommend "visible dirt"

### Draining

The excess water can be removed by spreading the leaves in sunlight for a brief period till the removal of water present on the leaf surface.

**Comment [A12]:** contradicts what is stated in the next paragraph

### Drying

It is estimated that only 20-40% of vitamin A will be retained if leaves are dried under direct sunlight, but that 50-70% will be retained if leaves are dried in the shade. High temperature may lead down to the breakage of protein present in the leaves. Therefore shade dry is recommended for the drying process. Spread the leaflets on the sterile clean green net in a well-ventilated room. Mosquito net may be used for this purpose because these materials give a space between the floor and the leaves. This room should be insect, rodent and dust proof. Air circulation can be improved by using ceiling and floor level vents protected with a clean filter to keep the sun and dust out. It is possible to use a fan, but the air must not be directly oriented towards the leaves, as it can increase contamination with germs in the air. It is advisable to turn the leaves over at least once, with sterile gloves, to improve uniform drying. Leaves should be completely dry within a maximum of 4 days. The loading density should not exceed 1 kg/m<sup>2</sup>. All persons involved in this step must ensure that, while on duty, personal cleanliness and hygiene are maintained. Personal protective equipment (PPE) such as head caps, nose masks, disposable gloves, etc. must be used at all times.

### Grinding

In small scale dried leafs can be grinded by electronic kitchen blender or pulvolizer machine can be used for fine grinding.

### Drying of the leaf powder

*Moringa* leaf powder immediately absorbs moisture and the product can reabsorb humidity during or after grinding. For this reason, *Moringa* leaf powder should be dried at 50<sup>0</sup> C for 30 minutes to reduce moisture content. If stored powder is exposed to heat or light it will degrade and the nutrient content will be reduced. *Moringa* Leaf Powder can be stored for up to 6 months under the following conditions: clean, dried powder stored in air-tight containers, protected from light and humidity, and kept below 24°C (75.2 °F).

### Formulation:

#### Moringa leaves Extract Formulation:

In a vessel, take purified water and add sugar to it. Heat it up to complete dissolution of the sugar. Once the sugar dissolve completely, continue boiling the solution for next 5 min and then cool it up to 60 -70° C temperature. In another vessel take water and add *Moringa oleifera* dried powder to it and heat up to 100 °C temperature for 2 hours. Later cool up to room temperature and filter the material and separate crude drug extract.

**Comment [A13]:** What was the capacity of the vessel?

**Comment [A14]:** Idem

Add crude drug extract in sugar syrup vessel with continuous stirring for 30 min. Add this to evaporating pan with continuous mixing & heat up to the occurrence of required dryness. Stop heating & cool up to room temperature and transferred all material to SS Ribbon blender for proper mixing. This formulation called as Minrich Extract.

#### Phytochemical Analysis of Moringa extract (Minrich Extract):

Sr. No.	Test Parameter	Moringa Extract
1	Flavonoide	+
2	Alkaloide	+
3	Glycocides	+
4	Steroid	-
5	Phenolic	+
6	Terpenoides	+
7	Saponin	+
8	Resin	+
9	Tannin	+
10	Cardiac glycoside	-
11	Carboxylic acid	+
12	Cumarin	-
13	Quinines	+

**Table No. 1: Phytochemical Analysis of Moringa extract:**

#### Anemic Woman Treatment:

24 college girls were selected for this work. The formulated moringa extract (Minrich Extract) were given to the 10 girls for one month period (10 g / day). Haemoglobin measurements, Absolute account, differential count RBC indices and platelets indices

**Comment [A15]:** What amount? There is no reference to quantities, which affects the quality of the product obtained for the treatments

**Comment [A16]:** as the amounts are not known, the administered dose cannot be defined

**Comment [A17]:** 10 girls are mentioned, but table 02 refers to 11 girls, check

test were conducted in Nidan Laboratories, Kopargaon by using Cyanmenhemoglobin method using *Hemocue*, using peripheral blood. Above all test were done before and after treatment of Moringa leaves extract.

### Result:

In table No. 02 it was observed that after the treatment with moringa extract, the hematological parameters such as WBC, RBC, Hb, platelets and differential counts were recorded to be in the normal range. It was significantly noticed that the Hb of the girls was increased after the treatment with the moringa extract (Minrich Rextract).

**Comment [A18]:** I recommend better explaining the design used

**Comment [A19]:** What criteria were considered to make the selection of the girls. Did they have anemia? Did they suffer from another disease? I believe that these aspects should be clarified or argued for the importance of the experiment and the results obtained.

Sample	Age	Hemoglobin		Total WBC		Neutrophil		Lymphocytes		Eosinophil		Monocytes		Basophil		R.B.C. Count		Platelet Count	
		Before Treated	After Treated	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
1	18	12.4	13.5	5100	6300	53	55	36	33	4	4	7	8	0	0	5.75	4.33	209000	207000
2	18	12.7	13.4	7000	7700	60	60	37	36	1	2	2	2	0	0	4.39	5.58	305000	225000
3	19	11.1	11.7	6400	6800	40	44	48	47	4	4	8	5	0	0	4.56	3.89	260000	220000
4	19	12.3	13.5	8200	8300	68	64	24	27	4	4	4	5	0	0	4.01	5.43	212000	182000
5	19	12.1	13.7	8700	8600	65	56	27	32	4	4	4	8	0	0	4.75	5.19	206000	182000
6	18	12.0	14.1	8400	7000	56	58	39	35	3	4	2	3	0	0	5.26	5.34	172000	166000
8	18	12.00	14.3	7000	6600	58	55	34	36	4	4	4	5	0	0	5.76	5.38	189000	156000
9	18	12.4	14.2	9800	10600	59	57	24	27	9	8	8	8	0	0	4.72	5.01	133000	208000
10	19	12.5	13.5	7200	6800	53	52	32	35	7	4	8	8	0	1	4.61	4.74	161000	166000
11	18	12.6	13.9	7400	6400	61	51	31	40	4	4	4	5	0	0	4.50	4.82	140000	158000

Table No. 02: haematological parameters of the before treatment and after treatment result.

### Discussion

Haemoglobin of the moringa extract treated group when compared with the before treatment group were , found out to be increased due to the phytochemical constituents in the extract and also presence of minerals and vitamins (Table No. 1). Due to the changing life style and various habits that are adapted the food lacks the nutrition which results in anemic conditions in teenage girls. To overcome these problems regular administration of the moringa leaf extract (Minrich Extract) could be a better alternative.

## Conclusion

The moringa extract (Minrich Extract) have the significant effect to increase the haemoglobin level in girls. The administration of *Moringa oleifera* leaf extract o on regular basis helps to maintain the other blood parameters such as WBC, RBC, and platelets in normal range.

## COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

## References:

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**Comment [A20]:** The document does not specify whether the girls were subjected to the same diet and only the moringa ingestion varied. I believe that these statements should not be reached. For this reason, I think the discussion should be written differently.

**Comment [A21]:** I recommend considering the previous comment because the development of the discussion may cause the conclusion to be modified.

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