

Pharmacognostical & physicochemical Analysis of *Musta-Triphaladi Avalehya*, used in the management of *Thalassemia Major*

Review Article

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Abstract

According to the World Health Organization (WHO) *Thalassemia* is the most prevalent genetic blood disorder in the world. *Thalassemic* patients are suffering from hypochromic, microcytic anemia due to the early excessive destruction of red blood cells. Due to the complications and incompleteness of modern medical management of the disease, need arises of some adjuvant therapy like *Ayurveda*. Hence present study was carried out to standardize the finished product of *Musta-triphaladi Avaleha*, an *Ayurveda* formulation which is used in the management of *Thalassemia Major*, to conform its identity, quality and purity. The finished product was used for the pharmacognostical study; organoleptic characteristics and microscopical study of the *Musta-triphaladi Avaleha* by showing characteristic features of hat all ingredients used were genuine and all were found in the finished product too. Physico-Chemical Parameters of *Musta-Triphaladi Avaleha* were found as pH value 6.0, ash value 0.142 g and Acid insoluble ash was 0.193 % w/w.

Keywords: *Musta-triphaladi Avaleha*, Pharmacognostical, Physico-Chemical, *Thalassemia Major*.

Introduction

In the present scientific era, *Ayurveda* also becomes globalized due to its holistic nature leading to high demand. There is a huge trend in people to turn towards herbal medicine like *Ayurveda*. Though *Ayurveda* is holistic and cost effective with good therapeutic effects, the therapeutic effect depends on the quality of the drug administered. A quality drug results into best results. Hence present study was carried out to standardize a finished product viz. *Musta-Triphaladi Avaleha*, to conform its identity, quality, and purity. This is an *ayurvedic* formulation modified by Rajgolkar S. *etal* (2014) (1) which is used as an adjuvant drug in the management of *Thalassemia Major*.

According to the World Health Organization (WHO) *thalassemias* are the most common inherited single-gene disorders in the world (2). *Thalassemia* is a monogenic disorder characterized by abnormal synthesis of hemoglobin due to defects in the globin chain. This causes early excessive destruction of red blood cells leading to hypochromic, microcytic anemia the characteristic presenting symptom of *thalassemia*.

According to clinical severity, *thalassemia* can be classified into 3 types, such as *Thalassemia Major* (TM), *Thalassemia Intermedia* (TI) and *Thalassemia minor* (Tm) or traits (3). The mainstay of managing the condition is repeated blood transfusion and it is the only and easy measure that each *thalassemic* patient can undergo. But due to the repeated blood transfusion therapy, and increased gastrointestinal iron absorption, iron gets accumulated in the body. This Iron overload causes morbidity and organ toxicity (4) and this accumulated Iron is reduced by regular chelation therapy, though it is also having some side effects (5). Due to those complications and incompleteness of modern medical management, there is a need of some adjuvant therapy (like *Ayurveda*), and it should be applied simultaneously with the blood transfusion which help to increase the blood transfusion interval, to enhance the quality of life and life span of the *thalassemic* patients, and to minimize the complications. *Musta-triphaladi Avaleha* is a herbal drug compound prepared in dosage format of *Avaleha* (i.e. lincture) and has been tried clinically as an adjuvant with proven results. To ensure the quality standards of the formulation such as identity, quality, and purity of ingredients and finished product along with preliminary physico-chemical parameters and pharmacognostical characteristics, this study was carried out.

Materials and methods:

Ingredients of *Musta-Triphaladi avalehya*

Ingredients of *Musta-Triphaladi Avaleha* are as shown in the Table - 1.

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Table 1. Ingredients of Musta-Triphaladi Avaleha

No.	Drug Name	Latin Name	Part Used
1	Musta	<i>Cyprus rotundus</i> Nust.	Dry Rhizome
2	Amalaki	<i>Embllica officinalis</i> Gaertn.	Dry Fruit
3	Haritaki	<i>Terminalia chebula</i> Retz.	Dry Fruit
4	Vibhitaki	<i>Terminalia bellerica</i> Roxb.	Dry Fruit
5	Katuki	<i>Picrorhiza kurroa</i> Royle ex Benth.	Dry Root
6	Kakmachi	<i>Solanum nigrum</i> Linn.	Dry Whole plant
7	Kutaja	<i>Holarrhena antidysenterica</i> Wall.	Dry Bark
8	Haridra	<i>Curcuma longa</i> Linn.	Dry Rhizome
9	Vidanga	<i>Embelia robusta</i> Burm	Dry Fruit
10	Guduchi	<i>Tinospora cordifolia</i> Willd.	Dry Stem
11	Shweta Punarnava	<i>Trianthema portulacastrum</i> Linn.	Dry Root
12	Sharapunkha	<i>Tephrosia purpurea</i> Linn.	Dry Root
13	Apamarga	<i>Achyranthus aspera</i> Linn.	Dry Whole plant
14	Kadali	<i>Musa paradisiacal</i> Linn,	Dry Rhizome powder
15	Shatavari	<i>Aspergus recemosus</i> Willd.	Dry Root
16	Shigru	<i>Moringa oleifera</i> Lam.	Dry Root bark
17	Vasa	<i>Adhatoda vasica</i> Nees	Dry Leaves
18	Daruharidra	<i>Berberis aristata</i> DC	Dry Root
19	Sariva	<i>Hemidesmus indicus</i> R.Br.	Dry Root
20	Manjishtha	<i>Rubia cordifolia</i> Linn.	Dry Root
21	Madhu	Honey	----
22	Sharkara	<i>Saccharum officinarum</i> Linn	Crystal
23	Chaturjata		
	Twak	<i>Cinnamomum zeylanicum</i> Blume	Dry Bark
	Ela	<i>Elettaria cardamomum</i> Maton	Dry Seed
	Tamalapatra	<i>Cinnamomum tamala</i> Nees & Eberm	Dry Leaf
	Nagakesara	<i>Mesua ferrea</i> Linn	Dry Pushpakalika
24	Trikatu		
	Shunthi	<i>Zingiber officinale</i> Rosc.	Dry Rhizome
	Maricha	<i>Piper nigrum</i> Linn.	Dry Fruit
	Pippali	<i>Piper longum</i> Linn.	Dry Fruit

Preparation of the drug

The test drug was prepared in the Pharmacy, Gujarat Ayurved University, Jamnagar. The whole plant of *Sharapunkha* (*Tephrosia purpurea* Linn.) was purchased from the local market and rhizomes of *Kadali* (*Musa paradisiacal* Linn.) were collected from the international hostel premises, GAU, Jamnagar. They were authenticated by the experts of Pharmacognosy laboratory, I. P. G. T. & R. A., Jamnagar and then submitted in Pharmacy for making of *Musta-Triphaladi Avaleha*, and the other remaining drugs were provided by the raw drug store of Pharmacy. The Finished product of test drug was used for the pharmacognostical and physico-chemical Parameters study at the Pharmacognosy laboratory and the Pharmaceutical chemistry laboratory respectively.

Pharmacognostical study

The pharmacognostical study comprises of organoleptic study and microscopic study of finished product.

Organoleptic Study:

Characters like color, odour, taste and touch of *Musta-Triphaladi Avaleha* are studied by organoleptic parameters i.e. sensory observations.

Microscopic Study:

Small quantity of *Musta-Triphaladi Avaleha* was dissolved with distilled water and few drops were spread on a glass slide, covered with a cover slip and excessive water was removed with filter paper. Microscopic evaluation was done with the prepared slide with and without staining studied under Carl-zeiss Trinocular microscope. (6)

Physico-chemical parameters

Following Physico-chemical parameters were analyzed for different physico-chemical parameters methods at the pharmaceutical chemistry lab, IPGT&RA. (7)

Physico-chemical Parameters for *Musta-Triphaladi Avaleha*:

- a. Loss on drying
- b. Ash value
- c. Water soluble extract
- d. Methanol soluble extract
- e. pH
- f. Acid insoluble Ash

Observations and results:

Pharmacognostical study

Organoleptic study :

Characters like color, odour, taste and touch of *Musta-Triphaladi Avaleha* were studied by sensory observations results were depicted in the table no2.

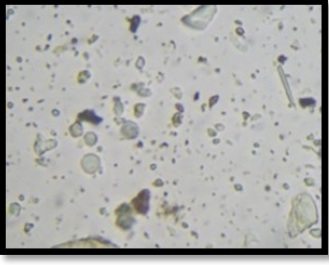
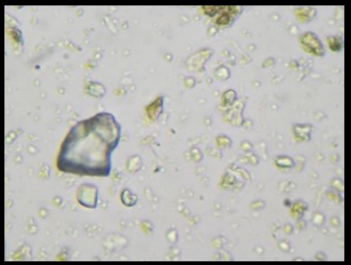
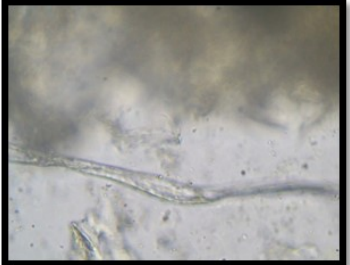

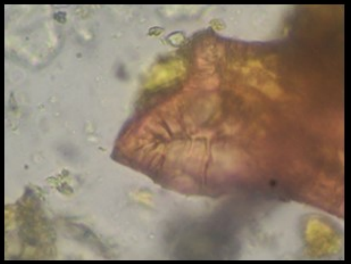

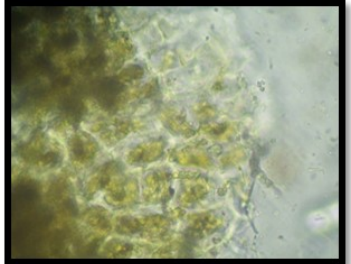

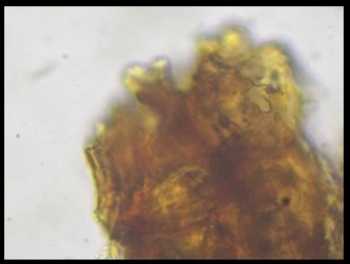
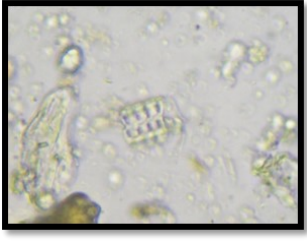

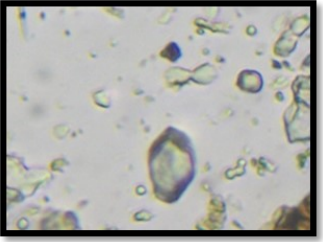
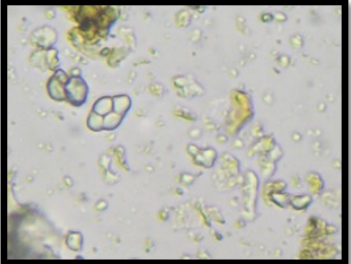

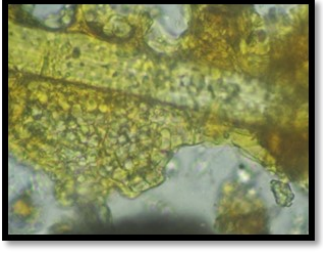
Table 2. Organoleptic characteristics of *mustatriphaladi avaleha*

Sr. No.	Parameters	Observations
1.	Colour	Chocolate brown
2.	Odour	fragrant
3.	Taste	sweet
4.	Touch	Semi solid

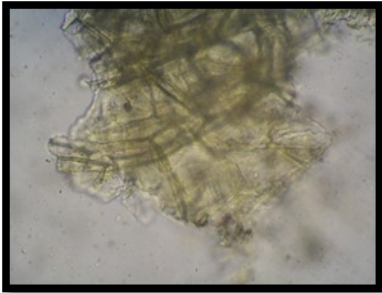
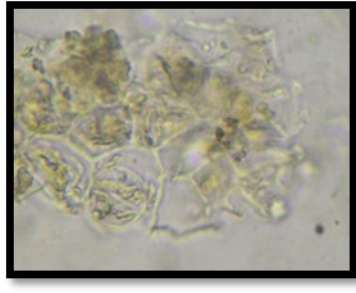

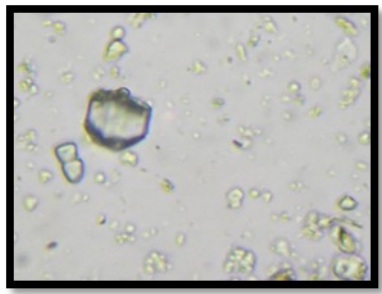

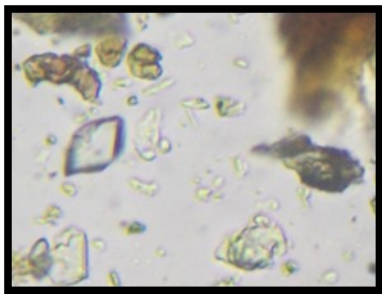





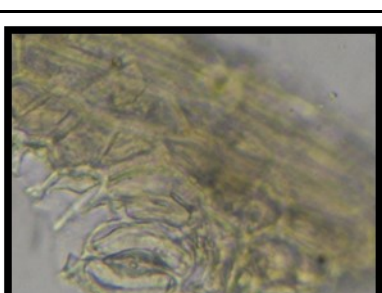

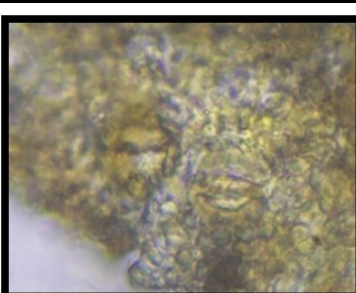

Microscopical Study:

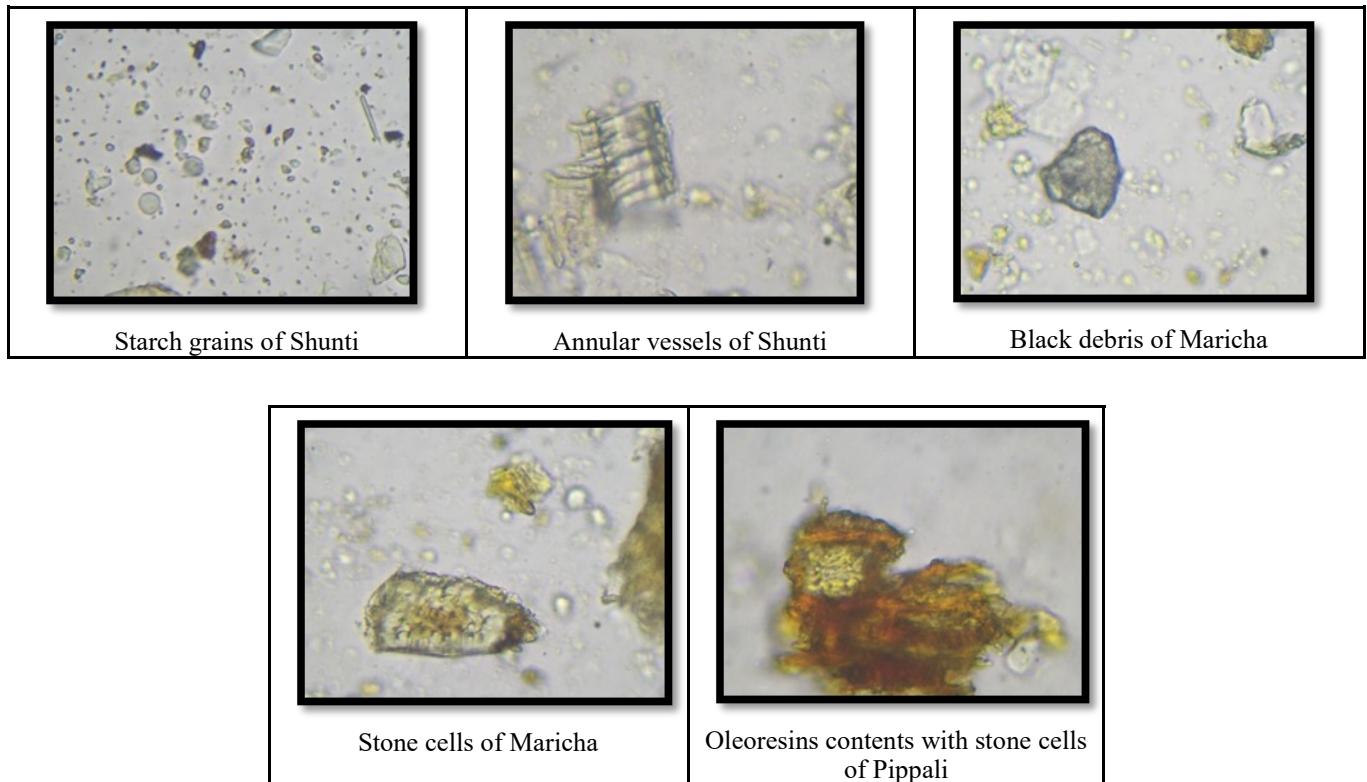
Pharmacognostical characteristics of *Musta-triphaladi Avaleha* under the microscope showed that Starch grains and Silica Deposition of *Musta*, fibers of *Amalaki*, Scleroids and stone cells of *Haritaki*, Simple trichome and Epicarp cells of *Vibhitaki*, Cork cells in surface with brown contents and Parenchyma cells with starch grains of *Katuki*, Pitted vessels and Pollen grains of *Kakamachi*, Rhomboidal Crystals and Compound starch Grains of *Kutaja*, Oleoresins Contents and Parenchyma cells with starch grains of *Haridra*, Oleoresins and Epicarp cells of *Vidanga*, Collenchyma cells and Cork cells of *Guduchi*, Stomata with epidermal cells and Fibers with broad Lumen of *Shweta Punarnava*, Simple warty trichomes and Spiral vessels of *Sharapunkha*, Boarded pitted vessels and Septed fibers of *Apamarga*, simple starch grains and Silica deposition of *Kadali*, Acicular Crystals and Fragments of scalariform vessels of *Shatavari*, Fibers passing through medullary region and cork cells in surface view of *Shigru*, stomata and multi cellular Trichome of *Vasa*, Rhomboidal crystals and stone cells of *Daruharidra*, Prismatic crystals and Stone cells of *Sariva*, Warty trichome and boarded pitted vessels of *Manjishtha*, parasite stomata lignified fibers of *Twak*, Epidermal cells with stomata of *Ela*, Lignified fibers and Epidermal cells with stomata of *Tamalapatra*, Pollen grains of *Nagakesara*, Starch grains and Fragments of annular vessels of *Shunthi*, Black debris and stone cells of *Maricha*, and finally oleoresins contents with stone cells of *Pippali*; the microphotographs of the same are depicted in Plate1.

Plate 1. Microphotographs of *Mushta-triphaladi Avaleha*

 <p>Starch grains of Musta</p>	 <p>Sillica Deposition of Musta</p>	 <p>Fibers of Amalaki</p>
 <p>Scleroids of Haritaki</p>	 <p>Stones cells of Haritaki</p>	 <p>Simple trichome of Bibitaki</p>
 <p>Epicarp cells of Bibitaki</p>	 <p>Cork cells in surface with brown contents of Katuki</p>	 <p>Parenchyma cells with starch grains of Katuki</p>
 <p>Pitted vessels of Kakamachi</p>	 <p>Pollen grains of Kakamachi</p>	 <p>Rhomboidal Crystals of Kutaja</p>
 <p>Compound starch grains of Kutaja</p>	 <p>Oleoresins Contents of Haridra</p>	 <p>Parenchyma cells with starch grains of Haridra</p>

<p>Oleoresins of Vidanga</p>	<p>Epicarp cells of Vidanga</p>	<p>Collenchyma cells of Guduchi</p>
<p>Cork cells of Guduchi</p>	<p>Stomata with epidermal cells of Swetha Punarnawa</p>	<p>Fibers with broad lumen of Swetha Punarnawa</p>
<p>Simple warty trichomes of Sharapunkha</p>	<p>Spiral vessels of Sharapunkha</p>	<p>Boarded pitted vessels of Apamarga</p>
<p>Septed fibers of Apamarga</p>	<p>Simple starch grains of Kadali</p>	<p>Silica deposition of Kadali</p>
<p>Acicular Crystals of Shatawari</p>	<p>Scalariform vessels of Shatawari</p>	<p>Fibers passing through medullary region of Shigru</p>

		
<p>Cork cells in surface view of Shigru</p>	<p>Stomata of Vasa</p>	<p>Multi cellular trichome of Vasa</p>
		
<p>Rhomboidal crystals of Daruharidra</p>	<p>Stone cells of Daruharidra</p>	<p>Prismatic crystals of Sariva</p>
		
<p>Stone cells of Sariva</p>	<p>Warty trichome of Manjistha</p>	<p>Boarded pitted vessels of Manjistha</p>
		
<p>Parasite stomata of Twak</p>	<p>Lignified fibers of Twak</p>	<p>Epidermal cells with stomata of Ela</p>
		
<p>Lignified fibers of Tamalapatra</p>	<p>Epidermal cells with stomata of Tamalapatra</p>	<p>Pollen grains of Nagakeasra</p>



Physico-Chemical Analysis

Different parameters such as Loss on drying, pH Value, Water soluble extractive, Alcohol soluble extractive etc. were analyzed for different physico-chemical parameters and results are depicted in the table no.3:

Table 3. Physico-Chemical Parameters of *Musta-Triphaladi Avaleha*

No.	Parameters	<i>Musta-Triphaladi Avaleha</i>
1.	Loss on drying at 110°C	11.094 % w/w
2.	pH Value	6.0
3.	Water soluble extractive	76.29 % w/w
4.	Alcohol soluble extractive	83.65 % w/w
5.	Ash Value	0.142 g
6.	Acid insoluble Ash	0.193%

Discussion

The therapeutic effect depends on the quality of the drug administered. To obtain the expected outcome after administration on particular disease, especially a combined drug formula all ingredients should be present in it. Pharmacognostical characteristic of *Musta-Triphaladi Avaleha* under the microscope showed characters of all the ingredients of finished product, thus the study proves the quality of the final product. Preliminary physicochemical parameters also are within the standardized range.

Conclusion

Preliminary organoleptic characteristics and microscopic study of the *Musta-triphala* *Avaleha* showed that all ingredients used were genuine and all

were found in the finished product too. Hence quality of *Musta-triphala* *Avaleha* is established in the given standard conditions and this study outcome may be considered as reference standard in future scientific studies.

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