Research Article

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AN ANALYSIS OF PHARMACOGNOSTICAL AND PHYTOCHEMICAL COMPOSITION OF KANDA TWAKA CHURNA AND PATRA CHURNA OF SHIGRU (*MORINGA OLEIFERA* LAM.)

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ABSTRACT

Moringa oleifera Lam. belongs to the Moringaceae family, popularly known as Sahijana, Shigru, Shobhanjana, Krishnagandha etc. The importance of Shigru in treatment has been mentioned in various classical texts for ages. Different parts of the drug, i.e., stem bark, leaves, seed, pods, root, etc., contain many chemical constituents that are significant in pharmacology. Pharmacognostical and phytochemical analyses are essential for proper identification and authentication of the drug. Materials and method: Shigru kanda twaka churna and Shigru patra churna were evaluated separately for pharmacognostical, physicochemical, and phytochemical studies. It also included a qualitative test for detecting protein, carbohydrate, ascorbic acid, sterols, and terpenes as per the Ayurvedic pharmacopoeia of India (A.P.I.). Results: The correct identity and authenticity of the drug sample were confirmed by its organoleptic study, powder microscopy, and phytochemical study, comparing them with features mentioned in A.P.I., and then certified by subject experts in Govt. Drug testing laboratory, Dist. Gwalior M.P. and Institute of Pharmacy, Vikram University Ujjain M.P. Conclusion: Based on the present study, we can conclude that both the sample drugs were authentic, pure and followed standard parameters of A.P.I.

Keywords: Shigru, *Moringa oleifera* Lam. pharmacognostical, phytochemical analysis

INTRODUCTION

Ayurveda is the traditional Indian system of medicine, which is prosperous of many classical literatures that provide information regarding several herbal drugs. Shigru *(Moringa oleifera* Lam.) is one of them. Shigru has been described under *"*Guduchyadi Varga*"* based on flower colours. There are three Shigru varieties: Shyam Shigru, Shweta Shigru, and Rakta Shigru[1]. Nila Shigru is mentioned in only Raja Nighantu, having katu, madhur rasa, tikshna, ushna and pichchhil properties. It is described as *"*Rochno Parama*"*[2]. Regarding the rasa panchak of Shigru, almost all the authors described Shigru as having katu tikta rasa, tikshna, laghu, ruksha in guna*; its* veerya is ushna, katu in vipaka[3]. Karmas of Shigru are as follow: vidahi, shothahara, vidradhipachana, shirovirechana, vednasthapana, deepan, pachana, rochana, vidahi, grahi, shoolaprashamana, krimighna, saraka, hriddvittejaka, kaphaghna, artavajanana, medoghana, vishaghna, swedajanana, kushthaghna, jwaraghna, lekhana, chakshushya[4].

Aims and objective

- To study the organoleptic characters of Shigru kanda twaka churna and Shigru patra churna.
- To study powder microscopy of Shigru kanda twaka and Shigru patra.
- To analyze the samples using different physicochemical/ phytochemical parameters and qualitative methods.

MATERIAL AND METHODS

The organoleptic study, microscopic study, and qualitative chemical analysis of Shigru (*Moringa oleifera)* Kanda twaka churna and Shigru patra churna were carried out to determine diagnostic features, identification and standardization of the drug.

Collection of Samples

Moringa oleifera Lam. stem bark and leaves were collected by the scholar and certified by the subject experts in Govt. Drug testing laboratory district Gwalior, M.P. and Institute of Pharmacy, Vikram university Ujjain M.P. after authentication and identification of plant, stem bark and leaves of Shigru were processed by proper method and a fine powder of both drugs were prepared separately with the help of pulverizer and sieved then the fine powder of drug was packed and labelled for further study.
Sample A- Shigru kanda twaka churna
Sample B- Shigru patra churna

Procedure

The present study of the Shigru (*Moringa oleifera*) in some sections, namely pharmacognostical studies, physicochemical analysis and preliminary qualitative chemical analysis.

Pharmacognostical study: Pharmacognostical study was completed by using organoleptic parameters, i.e., colour, odour, taste and texture of sample drugs and powder microscopy was done according to the standard procedure described in A.P.I.[5-6]

Preliminary physicochemical and phytochemical analysis: The preliminary physicochemical and phytochemical analysis of the kanda twaka churna and patra churna of Shigru was done according to the standard procedures described in A.P.I. which includes foreign matter, loss on drying (determination of moisture

content), total ash, acid insoluble ash, alcohol soluble extractive, water soluble extractive, thin layer chromatography (TLC).

Preliminary qualitative chemical analysis

Test for Proteins

Biuret Test: 2 ml extract of the sample was taken in a test tube; add 2 ml NaOH followed by 5-6 drops of 1% $CuSO_4$ solution, and gently shake for 4-5 minutes. violet/bluish colour appears. It indicated the presence of proteins.

Test for Carbohydrate

Molisch's Test: Take 2 ml aqueous extract treated with alcoholic alpha-naphthol, shake and concentrated H_2SO_4 from the sides of the test tubes. A violet colour ring appears at the junction of two liquids. It indicated the presence of carbohydrates.

Benedict's Test: Take 2 ml of aqueous extract, add 2 ml of Benedict's reagent, and heat it for 2-3 minutes. The solution appears green, yellow or red depending on the amount of reducing sugar in the test solution.

Test for Ascorbic Acid

Take 2 ml of a 2% w/v solution, add 2 ml of water, 0.1 gm of $NaHCO_3$ and about 20 mg of $FeSO_4$, shake and allow to stand; a deep violet colour is produced. Add 5 ml of 1M Sulphuric acid, the colour disappears.

Test for Sterols and Terpenes

Salkowski reaction: 2 ml extract was taken in a test tube, 2 ml chloroform and 2 ml concentrated H_2SO_4. Shake well. The chloroform layer appears red, and the acid layer shows greenish-yellow fluorescence.

Liberman's reaction: Mix 3 ml extract with 3 ml acetic anhydride, heat and cool. Add a few drops of concentrated H_2SO_4. The blue colour appears. [7]

RESULTS

Pharmacognostical Study

Organoleptic study

The final products of drugs were evaluated separately by organoleptic parameters. (Table 1)

Table 1: Organoleptic properties of Shigru kanda twaka churna and Shigru patra churna

Parameters	Shigru kanda twaka churna	Shigru patra churna
Colour	Dark brown	Green
Odour	Unpleasant	Unpleasant
Taste	Bitter and pungent	Bitter
Texture	Fine	Fine and smooth

Figure 1: Stem bark of Shigru

Figure 2: Dried leaves of Shigru

Figure 3: Samples for drug testing

Figure 4: Shigru kanda twaka churna

Figure 5: Shigru patra churna

Microscopic study

In sample A, the diagnostic characters of the stem bark powder of Shigru *(Moringa oleifera)* were observed, i.e., oil globules (Figure 6); numerous, simple, oval to round, starch grains (Figure 7), rosette crystals of calcium oxalate (Figure 8), elongated to polygonal stone cells (Figure 9).

In sample B, the diagnostic characters of leaves powder of Shigru (*Moringa oleifera)* were observed, i.e., spongy parenchyma palisade cells (Figure 10), rosette crystals of calcium oxalate (Figure 11), spiral vessel (Figure12), unicellular hairs with a blunt tip (Figure13).

Powder Microscopy of Shigru Stem Bark

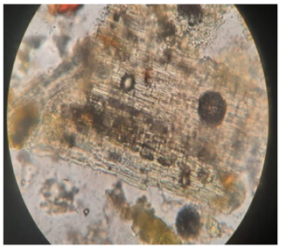

Figure 6: Oil globule

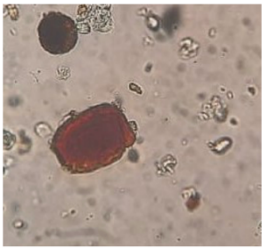

Figure 7: Starch grains

Figure 8: Rosette crystals of calcium oxalate

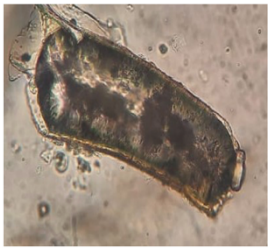

Figure 9: Stone cells

Powder Microscopy of Shigru Leaves

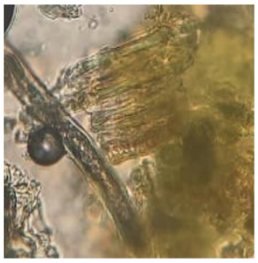

Figure 10: Palisade cells

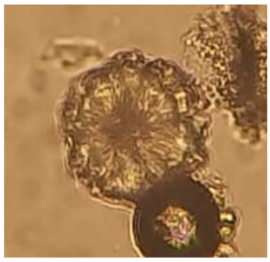

Figure 11: Calcium oxalate rosette crystals

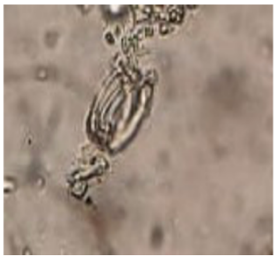

Figure 12: Spiral vessel

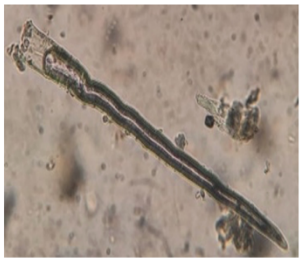

Figure 13: Unicellular hairs with blunt tip

Physicochemical and Phytochemical Analysis

Table 2: Physiochemical analysis of Shigru kanda twaka churna

Name of the test	Findings in Shigru kanda twaka churna	Standards as per A.P.I
Foreign Matter	Nil	Not more than 2%
Loss on Drying at 105 ^{0}C	9.37%	-
Total Ash	8.19%	Not more than 11%
Acid Insoluble ash	0.84%	Not more than 1%
Alcohol Soluble Extractive	4.14%	Not less than 1%
Water Soluble Extractive	13.99%	Not less than 5%

Table 3: Physiochemical analysis of Shigru patra churna

Name of the test	Findings in Shigru patra churna	Standards as per A.P.I
Foreign Matter	Nil	Not more than 2%
Loss on Drying at 105 ^{0}C	9.11%	-
Total Ash	10.58%	Not more than 16%
Acid Insoluble ash	2.21%	Not more than 4%
Alcohol Soluble Extractive	9.31%	Not less than 8%
Water Soluble Extractive	23.3%	Not less than 22%

TLC (Thin layer chromatography): Thin layer chromatographic study of the samples was carried out. TLC profiles will help evaluate the quality of the drugs. Details are as follows-
Sample – Ethanolic extract of Shigru kanda twaka churna
Absorbent layer- Silica gel G
Solvent system- Toluene 9:Ethyl acetate 1
Detection- At UV light 366 nm
Sample- Ethanolic extract of Shigru patra churna
Absorbent layer- Silica gel G
Solvent system- Toluene 9: Ethyl acetate 1
Detection- At U.V. light 254nm, At U.V. light 366nm at visible light

Preliminary Qualitative Chemical Analysis

Table 4: Qualitative analysis

Component	Name of test/reagent	Shigru patra churna	Shigru kanda twak churna
Protein	Biuret test	+ ve	-
Carbohydrate	Molisch's test	+ve	-
	Benedict's test	-ve	-
Ascorbic acid		+ve	
Sterols	Salkowski reaction	-	+ve
Terpenes	Salkowski reaction	-	+ve

DISCUSSION

Moringa oleifera Lam. is a commonly used medicinal plant in Ayurveda. The present work was taken up to lay down detailed pharmacognostical and photochemical standards, which would contribute significantly to the quality control of medicinally useful *Moringa oleifera.* The mature stem bark of *Moringa oleifera* is rough and deeply cracked, and the thickness of the bark is 1-3 cm or more, depending upon the age of the plant. The mature stem bark is identified by grey or dark green colour while young bark is greenish to greenish-brown[8]. Moringa has tripinnate compound leaves, available in the form of leaflets and some broken pieces of rachis, leaflets 1.2-2 cm long and 0.5-1 cm wide. The colour of the leaves is greenish grey to pale green[9]. On powder microscopy, the stem bark powder is characterized by oil globules, starch grains scattered, and rosette crystals of calcium oxalate and elongated to polygonal stone cells with lumen. The diagnostic characteristics of leaves powder are rosette crystals of calcium oxalate, palisade cells, spiral vessels and unicellular hairs with blunt tips. In physicochemical analysis, both samples were free from foreign matter, following the A.P.I. standard of not more than 2%, which indicates the samples were free from moulds, insects, animal faecal matter and other contamination such as stones, etc. Loss on drying is a water-holding property of the test substance, was found at 9.37% in sample-A and 9.11% in sample-B; Ash value used to determine foreign inorganic matter present as an impurity, Total ash value in sample-A 8.19% and 10.58% in sample-B, both samples were followed A.P.I. standard, i.e., not more than 11% and not more than 16% respectively. A higher limit of Acid insoluble ash is incorporated, especially in cases where silica may be present or when the calcium oxalate content of the drug is very high. In sample A, the value of Acid insoluble ash is 0.84%, and in sample B, 2.21%, followed by the A.P.I. standard, i.e., not more than 1% in sample A and not more than 4% in B. Estimation of extractive values determines the amount of the active constituents in a given amount of plant material when extracted with a particular solvent. The high water solubility (in sample A 13.99% and in sample B 23.3%) of the contents than alcohol solubility (4.14% in sample A, 9.31% in B) of both stem bark and leaves suggest aqueous extract for future studies both the samples were followed A.P.I. standard: for alcohol soluble extractive, i.e. not less than 1% and 8% for sample A and B respectively, for water-soluble extractive i.e. not less than 5% and not less than 22% in sample A and B respectively. The preliminary qualitative analysis showed the presence of protein, carbohydrate, and ascorbic acid in patra churna of Shigru and sterols and terpenes in kanda twaka churna of Shigru. TLC of kanda twaka churna and patra churna of Shigru were carried out; the best separation was achieved using Toluene-ethyl acetate as a solvent system in a ratio of 9:1.

CONCLUSION

Based on the present study, we can conclude that both the sample drugs were authentic, pure and followed standard parameters. Various physicochemical parameters, such as loss on drying, total ash, acid insoluble ash, etc., were found within standard limits. The preliminary qualitative analysis of Shigru patra churna showed the presence of protein, carbohydrate and ascorbic acid. The Shigru kanda twaka churna showed the presence of sterols and terpenes. All examined standardization parameters provide understanding in authentication and identification of *Moringa oleifera* Lam.

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