



**RESEARCH STUDY OF SHANKHPUSHPI & MANDUKPARNI W.S.R. TO  
PHARMACOGNOSTICAL ANALYSIS**

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**ABSTRACT**

*Ayurvedic drugs* are extensively but selectively researched and practiced from years in psychosomatic disorders. *Shankhpushpi* and *Mandukparni* both fall in the category of drugs which are being used to treat such ailments. This study was an attempt to evaluate the classically said drugs on the preclinical and clinical grounds, so analytical study of both the drugs have been carried out first to evaluate the pharmacognostical, phytochemical, microbial and presence of any heavy metal analysis of both the drugs. All standards have been followed according to API. Results have been reported in tabulated form and Chromatography of raw drug and prepared drug have been shown. It was reported that the drugs have been authentic and free from any microbial contamination. The details of all studies have been provided under this research article.

**KEYWORDS:** *Shankhpushpi, Mandukparni, Medhya* Drugs, Pharmacognosy.

**INTRODUCTION**

*Shankhpushpi* and *Mandukparni* are well described Ayurvedic herbs with their Ayurvedic properties and clinical uses. Both these drugs are classified as *Medhya* and indicated to be used in psychosomatic ailments while *Shankhpushpi* is specifically mentioned as *Medhya* among four *Medhya* drugs described by *Acharya Charaka*.<sup>[1]</sup> This study includes the analytical work done on both these plants. Analytical study of a medicinal plant includes pharmacognostical and phytochemical analysis. Pharmacognosy is the study of medicinal drugs derived from plants or other natural resources. The American society of Pharmacognosy defined Pharmacognosy as the study of physical, chemical, biochemical and biological properties of drugs, drug substances or potential drugs or drug substances of natural origin as well as the search for new drugs from natural sources.<sup>[2]</sup> It is also defined as the study of crude drugs.<sup>[3]</sup> Phytochemicals are the various active chemical compounds found in plants. Phytochemicals (from Greek phyto, meaning "plant") are chemicals produced by plants through primary or secondary metabolism. They generally have biological activity in the plant host and play a role in plant growth or defense against competitors, pathogens, or predators.<sup>[4]</sup>

**Shankhpushpi<sup>[5]</sup>**

Latin Name : *Convolvulus pluricaulis syn. Convolvulus microphyllus*

Family : Convolvulaceae

Basonym : *Shankhpushpi*

**Mandukparni<sup>[6]</sup>**

Latin Name : *Centella asiatica*

Family : Apiaceae

Basonym : *Mandukparni*

**METHODOLOGY:** The study has been carried out under the following processes with their details -

**1. Collection of Plants**

*Shankhpushpi*- The original plants have been collected from the campus of *Gaur Brahman Ayurvedic College & Hospital, Rohtak, Haryana*. Herbarium was prepared for identification and authentication of the drug was done and the drug was found genuine.

*Mandukparni*- The original plants were grown and collected in the garden of *Rishikul Campus, Haridwar, Uttarakhand and Rajeshwari garden, Bahadarabad, Haridwar, Uttarakhand*. Herbarium was prepared for identification and authentication of the drug was done and the drug was found genuine.

**2. Powder Microscopy:** The collected sample of both plants were dried and Powder Microscopy was performed.

**3. Physicochemical Study:** Both the plants were evaluated in Laboratory for their Physicochemical parameters like Moisture content, pH, Alcohol Extractive Value, Aqueous Extractive Value, Petroleum Ether Extractive Value, Total Ash, Acid Insoluble Ash, Water Soluble Ash.

**4. Phytochemical Study:** Phytochemical analysis was done for raw drug and *ghan-satva* of both the plants. Raw drugs and freshly prepared extracts of both plants were tested for the presence of various active phytocompounds like Carbohydrates, Alkaloids, Amino acids, Proteins, Saponins, Glycosides, Phenolic compounds, Steroids, Tannins and Flavonoides.

**5. Chromatography:** Thin Layer Chromatography (TLC) was performed for raw drug and *ghan satva* of both plants and observations were recorded under UV Short wavelength and Iodine vapours.

**6. Heavy Metal Analysis, Microbiological Study, Test for aflatoxins & Pesticide Residues:** These parameters were evaluated for both the plant *ghan satva* and observations were recorded separately.

## OBSERVATIONS AND RESULTS

### A. SHANKHPUSHPI

#### 1. Powder Microscopy [Pic. No. 1].

Pic.No	Character	Chemical Reagent	Present/Absent
1.1	Lignin	Phlorogucinol + HCl	Present
1.2	Cellulose	Iodine Solution	Present
1.3	Mucilage	Methylene Blue	Present
1.4	cell nuclei	Saffarinin	Present

#### 2. Physico-Chemical Analysis.

S.No.	Tests	Shankhpushi	Shankhpushi Ghansatva	API
1	Moisture content	6.63% v/w	20.82% v/w	-
2	Ph	5.2	5.1	-
3	Alcohol Extractive Value	18.23% w/w	25.37% w/w	> 6%
4	Aqueous Extractive Value	25.43 % w/w	100% w/w	> 10 %
5	Petroleum Ether Extractive Value	9.42% w/w	3.78 % w/w	-
6	Total Ash	8.68 % w/w	10.56 % w/w	< 17 %
7	Acid Insoluble Ash	2.95% w/w	3.58% w/w	< 8 %
8	Water Soluble Ash	5.56 % w/w	5.35% w/w	-

#### 3. Phytochemical Analysis of Raw Drug

##### 1. Carbohydrate test.

Sr. no.	Name of test	Aqueous extract	Alcohol extract	Petroleum ether extract
A.	Molisch test	-ve	-ve	-ve
B.	Benedict test	+ve	+ve	-ve
C.	Barfoed's test	-ve	-ve	-ve
D.	Fehling test	+ve	+ve	-ve

##### 2. Alkaloids.

A.	Dragondrof test	+ve	+ve	-ve
B.	Mayer's test	-ve	-ve	+ve
C.	Wagner's test	-ve	-ve	-ve
D.	Hager's test	+ve	+ve	-ve

##### 3. Amino acids.

A.	Ninhydrine test	-ve	+ve	-ve
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##### 4. Proteins

A.	Biuret test	-ve	-ve	+ve
B.	Xanthoprotic test	-ve	-ve	+ve
C.	Millon's test	+ve	+ve	-ve

##### 5. Saponin

A.	Foam test	+ve	-ve	-ve
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##### 6. Glycosides

A.	Borntragar's test	-ve	-ve	-ve
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##### 7. Phenolic compound

A.	Phenolic test	-ve	-ve	-ve
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##### 8. Steroids

A.	Salkowaski reaction	-ve	-ve	-ve
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**9. Tannin**

A.	FeCl <sub>3</sub> test	-ve	-ve	-ve
B.	Lead acetate test	+ve	+ve	-ve
C.	Potassium dichromate test	+ve	+ve	-ve
D.	Gelatin test	-ve	-ve	-ve

**10. Flavonoids**

A.	Shinods test	-ve	-ve	-ve
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**4. Phytochemical Analysis of *Shankpushpi Ghansatva*****1. Carbohydrate test**

Sr. no.	Name of test	Aqueous extract	Alcohol extract
A.	Molisch test	-ve	-ve
B.	Benedict test	+ve	+ve
C.	Barfoed's test	-ve	-ve
D.	Fehling test	+ve	+ve

**2. Alkaloids**

A.	Dragendroff test	+ve	+ve
B.	Mayer's test	-ve	-ve
C.	Wagner's test	-ve	-ve
D.	Hager's test	+ve	+ve

**3. Amino acids**

A.	Ninhydrine test	-ve	+ve
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**4. Proteins**

A.	Biuret test	-ve	-ve
B.	Xanthoprotic test	-ve	-ve
C.	Millon's test	+ve	+ve

**5. Saponin**

A.	Foam test	+ve	-ve
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**6. Glycosides**

A.	Borntrager's test	-ve	-ve
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**5. Thin Layer Chromatography [Pic. No. 2]**

Sample	Iodine Vapour (Pic. No. 2.1)		UV Short wavelength (Pic. No. 2.2)	
	No. of spots	Rf value	No. of spots	Rf value
<i>Shankpushpi</i>	7	0.23, 0.29, 0.36, 0.51, 0.73, 0.79, 0.82	5	0.23, 0.29, 0.36, 0.51, 0.73
<i>Shankpushpi ghansatva</i>	7	0.23, 0.29, 0.36, 0.51, 0.73, 0.79, 0.82	5	0.23, 0.29, 0.36, 0.51, 0.73

**6. Heavy Metal Analysis**

S. No.	Heavy Metal	<i>Shankpushpi Ghansatva</i>	Permissible Limit
1	Lead	Not Detected	<b>10ppm</b>
2	Arsenic	Not Detected	<b>3ppm</b>
3	Cadmium	Not Detected	<b>0.3ppm</b>
4	Mercury	Not Detected	<b>1ppm</b>

**7. Microbiological Analysis**

S.No	Analysis	<i>Shankpushpi</i>	<i>Shankpushpi Ghansatva</i>	Possible limit
1	Total Aerobic Microbial count	8475cfu/gm	46578 cfu/gm	100000 cfu/gm
2	Total Yeast & Mould count	274 cfu/gm	421 cfu/gm	1000 cfu/gm

## 8. Tests for Aflatoxins

S.No	Test for Aflatoxins	Shankpushpi	Shankpushpi Ghansatva	Possible limit
1	Aflatoxin B1	Absent	Absent	0.5ppm
2	Aflatoxin B2	Absent	Absent	0.1ppm
3	Aflatoxin G1	Absent	Absent	0.5ppm
4	Aflatoxin G2	Absent	Absent	0.1ppm

## 9. Pesticide Residue

Organophosphates	Shankpushpi Ghansatva
O,O,O-Triethyle thiophosphate	Not Detected
Thionazin	Not Detected
Sulfotep	Not Detected
Phorate	Not Detected
Dimethoate	Not Detected
Disulfoton	Not Detected
Methyle parathion	Not Detected
Parathion	Not Detected
Famphur	Not Detected

Organochlorines	Shankpushpi Ghansatva
Alpha-BHC	Not Detected
Beta-BHC	Not Detected
Gamma-BHC	Not Detected
Delta-BHC	Not Detected
Heptachlor	Not Detected
Aldrin	Not Detected
Heptachlor epoxide	Not Detected
Cis-Chlordane	Not Detected
Trans-Chlordane	Not Detected
pp-DDE	Not Detected
Dieldrin	Not Detected
Endrin	Not Detected
Endosulfan II	Not Detected
pp-DDD	Not Detected
Endrin Aldehyde	Not Detected
Endosulfan sulfate	Not Detected
pp-DDT	Not Detected
Endrin ketone	Not Detected
Methoxychlor	Not Detected

## B. MANDUKPARNI

## 1. Powder Microscopy [Pic. No. 3]

Pic. No	Character	Chemical Reagent	Present/Absent
3.1	Tannin	Dilute Ferric Chloride	Present
3.2	Mucilage	Methylene Blue	Present
3.3	Cutin	Sudan III	Present
3.4	cell nuclei	Safranin	Present

## 2. Physico-Chemical Analysis

S.No.	Tests	Mandukaparni	Mandukaparni Ghansatva	API
1	Moisture content	7.32 % v/w	21.15% v/w	-
2	pH	4.5	4.6	-
3	Alcohol Extractive Value	16.45 % w/w	26.69% w/w	> 9%
4	Aqueous Extractive Value	27.43 % w/w	49.58% w/w	> 20%
5	Petroleum Ether Extractive Value	8.76% w/w	2.56 % w/w	-
6	Total Ash	14.64 % w/w	15.43% w/w	< 17%
7	Acid Insoluble Ash	4.34 % w/w	5.89% w/w	< 5%
8	Water Soluble Ash	8.66 % w/w	9.95% w/w	-

**3. Phytochemical Analysis of Raw Drug****1. Carbohydrate test**

Sr. no.	Name of test	Aqueous extract	Alcohol extract	Petroleum ether extract
A.	Molisch test	-ve	-ve	-ve
B.	Benedict test	+ve	+ve	-ve
C.	Barfoed's test	-ve	-ve	-ve
D.	Fehling test	-ve	+ve	-ve

**2. Alkaloids**

A.	Dragondrof test	+ve	+ve	-ve
B.	Mayer's test	+ve	+ve	-ve
C.	Wagner's test	-ve	-ve	-ve
D.	Hager's test	-ve	-ve	-ve

**3. Amino acids**

A.	Ninhydrine test	-ve	-ve	+ve
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**4. Proteins**

A.	Biuret test	-ve	-ve	-ve
B.	Xanthoprotic test	+ve	+ve	-ve
C.	Millon's test	-ve	-ve	-ve

**5. Saponin**

A.	Foam test	+ve	-ve	-ve
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**4. Phytochemical Analysis of *Mandukparni Ghansatva*****1. Carbohydrate test**

Sr. no.	Name of test	Aqueous extract	Alcohol extract
A.	Molisch test	-ve	-ve
B.	Benedict test	+ve	+ve
C.	Barfoed's test	-ve	-ve
D.	Fehling test	-ve	+ve

**2. Alkaloids**

A.	Dragondrof test	+ve	+ve
B.	Mayer's test	+ve	+ve
C.	Wagner's test	-ve	-ve
D.	Hager's test	-ve	-ve

**3. Amino acids**

A.	Ninhydrine test	-ve	-ve
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**4. Proteins**

A.	Biuret test	-ve	-ve
B.	Xanthoprotic test	+ve	+ve
C.	Millon's test	-ve	-ve

**5. Saponin**

A.	Foam test	+ve	-ve
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**5. Thin Layer Chromatography [Pic. No. 4]**

Sample	Iodine Vapour (Pic. No. 4.1)		UV Short wavelength (Pic. No. 4.2)	
	No. of spots	Rf value	No. of spots	Rf value
<i>Mandukparni</i>	4	0.36, 0.38, 0.41, 0.59	3	0.36, 0.41, 0.59
<i>Mandukparni Ghansatva</i>	4	0.36, 0.38, 0.41, 0.59	3	0.36, 0.41, 0.59

**6. Glycosides**

A.	Borntragar's test	-ve	-ve	+ve
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**7. Phenolic compound**

A.	Phenolic test	-ve	-ve	-ve
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**8. Steroids**

A.	Salkowaski reaction	-ve	-ve	-ve
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**9. Tannin**

A.	FeCl <sub>3</sub> test	-ve	-ve	-ve
B.	Lead acetate test	+ve	+ve	-ve
C.	Potassium dichromate test	-ve	+ve	-ve
D.	Gelatin test	-ve	-ve	-ve

**10. Flavonoids**

A.	Shinods test	-ve	-ve	-ve
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**6. Glycosides**

A.	Borntragar's test	-ve	-ve
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**7. Phenolic compound**

A.	Phenolic test	-ve	-ve
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**8. Steroids**

A.	Salkowaski reaction	-ve	-ve
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**9. Tannin**

A.	FeCl <sub>3</sub> test	-ve	-ve
B.	Lead acetate test	+ve	+ve
C.	Potassium dichromate test	-ve	+ve
D.	Gelatin test	-ve	-ve

**10. Flavonoids**

A.	Shinods test	-ve	-ve
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**6. Heavy Metal Analysis**

S. No.	Heavy Metal	Mandukaparni Ghansatva	Permissible Limit
1	Lead	Not Detected	<b>10ppm</b>
2	Arsenic	Not Detected	<b>3ppm</b>
3	Cadmium	Not Detected	<b>0.3ppm</b>
4	Mercury	Not Detected	<b>1ppm</b>

**7. Microbiological Analysis**

S.No	Analysis	Mandukaparni	Mandukaparni Ghansatva	Possible limit
1	Total Aerobic Microbial count	9485 cfu/gm	5635 cfu/gm	100000 cfu/gm
2	Total Yeast & Mould count	324 cfu/gm	413 cfu/gm	1000 cfu/gm

**8. Tests for Aflatoxins**

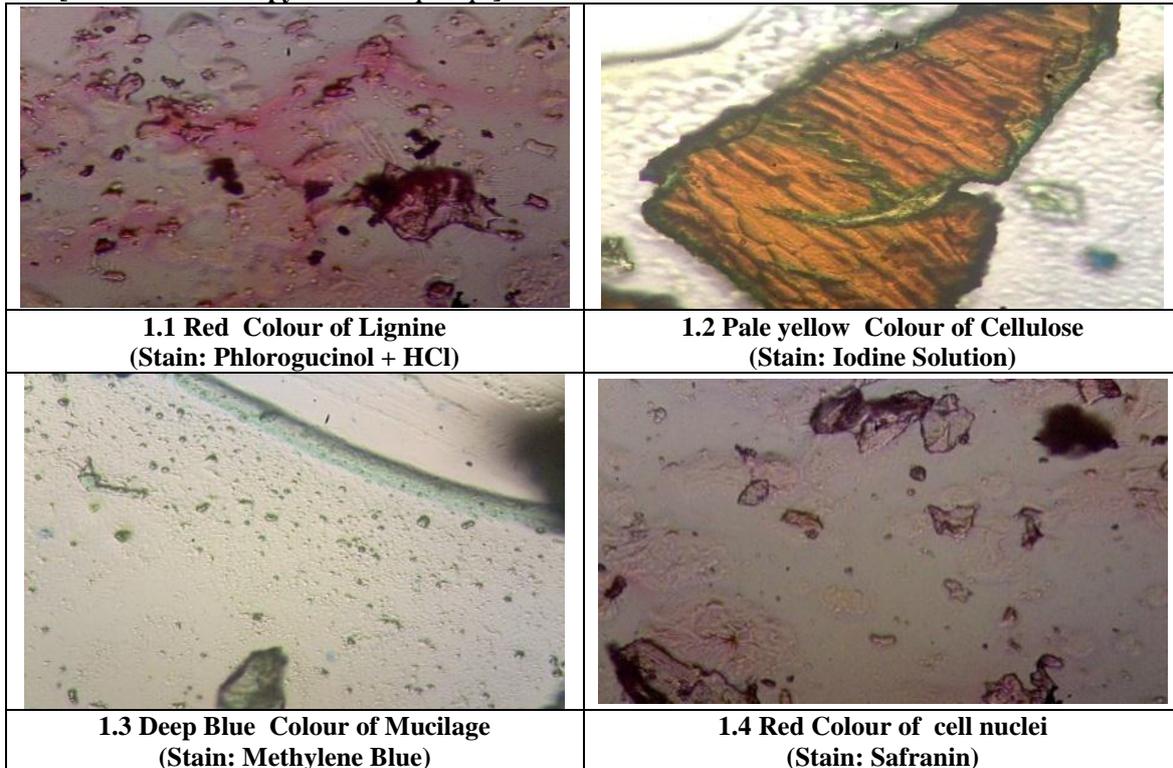
S.No	Test for Aflatoxins	Mandukaparni	Mandukaparni Ghansatva	Possible limit
1	Aflatoxin B1	Absent	Absent	0.5ppm
2	Aflatoxin B2	Absent	Absent	0.1ppm
3	Aflatoxin G1	Absent	Absent	0.5ppm
4	Aflatoxin G2	Absent	Absent	0.1ppm

**9. Pesticide Residue Analysis**

Organophosphates	Mandukaparni Ghansatva
O,O,O-Triethyle thiophosphate	Not Detected
Thionazin	Not Detected
Sulfotep	Not Detected
Phorate	Not Detected
Dimethoate	Not Detected
Disulfoton	Not Detected
Methyle parathion	Not Detected
Parathion	Not Detected
Famphur	Not Detected

Organochlorines	Mandukaparni Ghansatva
Alpha-BHC	Not Detected
Beta-BHC	Not Detected
Gamma-BHC	Not Detected
Delta-BHC	Not Detected
Heptachlor	Not Detected
Aldrin	Not Detected
Heptachlor epoxide	Not Detected
Cis-Chlordane	Not Detected
Trans-Chlordane	Not Detected
pp-DDE	Not Detected
Dieldrin	Not Detected
Endrin	Not Detected
Endosulfan II	Not Detected
pp-DDD	Not Detected
Endrin Aldehyde	Not Detected
Endosulfan sulfate	Not Detected
pp-DDT	Not Detected
Endrin ketone	Not Detected
Methoxychlor	Not Detected

Pic No. 1 [Powder Microscopy of *Shankpushpi*].



Pic. No. 2 [Thin Layer Chromatography of *Shankpushpi*].

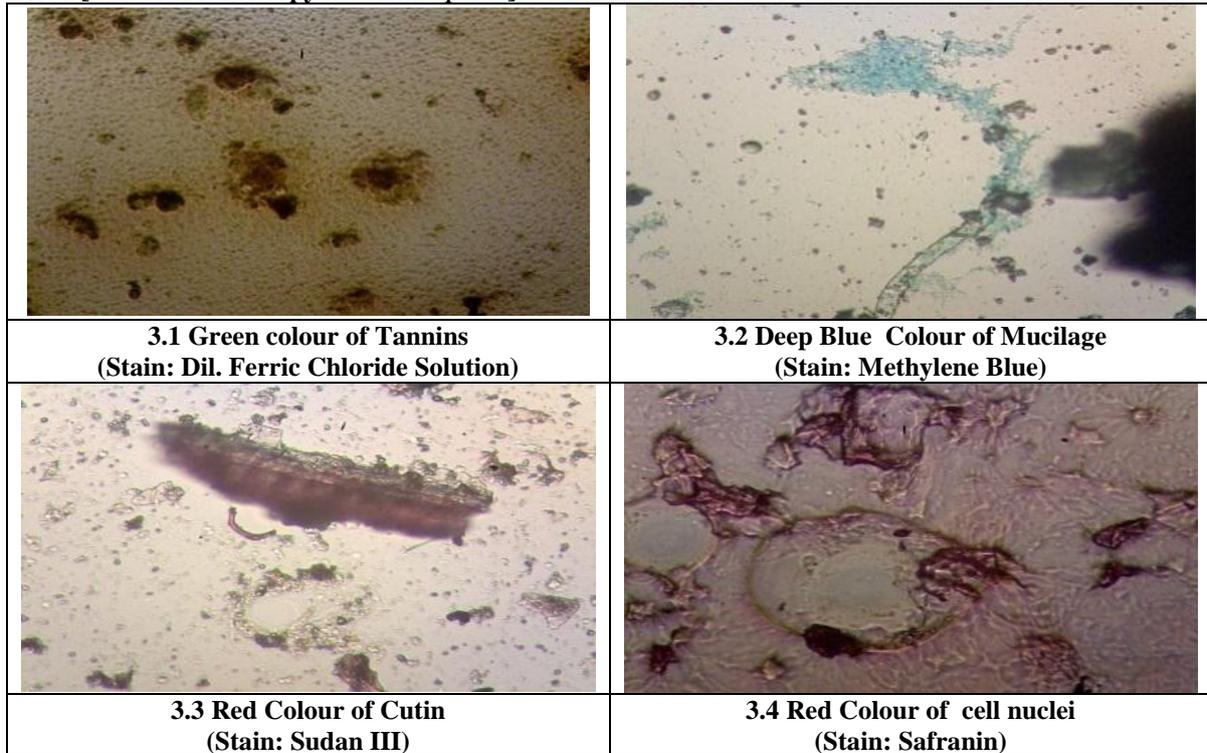
2.1 In Iodine Vapour

Samples	<i>Shankpushpi</i>	<i>Shankpushpi Ghansatva</i>
TLC Plate		
R <sub>f</sub> Value	0.23, 0.29, 0.36, 0.51, 0.73, 0.79, 0.82	0.23, 0.29, 0.36, 0.51, 0.73, 0.79, 0.82

2.2 In UV Short Wavelength

Samples	<i>Shankpushpi</i>	<i>Shankpushpi Ghansatva</i>
TLC Plate		
R <sub>f</sub> Value	0.23, 0.29, 0.36, 0.51, 0.73	0.23, 0.29, 0.36, 0.51, 0.73

Pic. No. 3 [Powder Microscopy of *Mandukparni*].

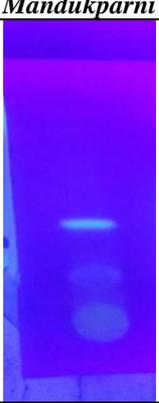
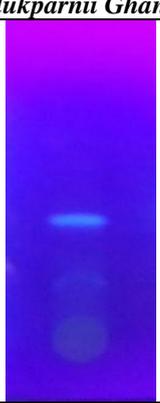


Pic. No. 4 [Thin Layer Chromatography of *Mandukparni*].

4.1 In Iodine Vapour

Samples	<i>Mandukparni</i>	<i>Mandukparni</i> Ghansatva
TLC Plate		
R <sub>f</sub> Value	0.36, 0.38, 0.41, 0.59	0.36, 0.38, 0.41, 0.59

4.2 In UV Short Wavelength

Samples	<i>Mandukparni</i>	<i>Mandukparni</i> Ghansatva
TLC Plate		
R <sub>f</sub> Value	0.36, 0.41, 0.59	0.36, 0.41, 0.59

## CONCLUSION

*Shankhpushpi*- The raw drug collected from the natural habitat in fresh form and the species identified by the BSI, Dehradun. Thin layer chromatography has shown seven  $R_f$  values at 0.23, 0.29, 0.36, 0.51, 0.73, 0.79, 0.82 for *Shankhpushpi Ghan satva* when observed in Iodine vapors while shows four  $R_f$  Values 0.23, 0.29, 0.36, 0.51, 0.73 when observed in UV Short wavelength. Powder microscopy of *Shankhpushpi* has detected the presence of Lignine, Cellulose, Mucilage and red coloured cell nuclei. Heavy metal analysis confirmed the absence of heavy metals in the *Shankhpushpi ghan satva*. Pesticide residues were not detected in the *Shankhpushpi ghan satva*. Total aerobic microbial count & total yeast and mould count showed the presence of microbes under permissible limits of API. After analytical evaluations, the drug was found genuine and safe for the further use in experimental and clinical study.

*Mandukparni*- The drug was cultivated naturally and then species was identified by Uttarakhand Space Application Center. Thin layer chromatography for the *Mandukparni ghan satva* has shown four  $R_f$  values at 0.36, 0.38, 0.41, 0.59 when observed under Iodine Vapours while three  $R_f$  values at 0.36, 0.41, 0.59 when observed under UV short wavelength. Powder microscopy has confirmed the presence of Tannin, Mucilage, Cutin and cell nuclei. Heavy metal analysis confirmed the absence of heavy metals in the *Mandukparni ghan satva*. Pesticide residues were not detected in the *Mandukparni ghan satva*. Total aerobic microbial count & total yeast and mould count showed the presence of microbes under permissible limits of API. After analytical evaluations, the drug was found genuine and safe for the further use in experimental and clinical study.

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