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Research Article

COMPARATIVE PHARMACOGNOSTICAL EVALUATION AND HPTLC ANALYSIS OF STEM BARK OF *KANCHNAR* (*BAUHINIA VARIEGATA* LINN.) AND *KOVIDAR* (*BAUHINIA PURPUREA* LINN.)

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ABSTRACT

The current study was carried out to provide comparative macroscopy, microscopy, physicochemical parameters and HPTLC analysis of stem bark of *Kanchnar (Bauhinia variegata* L.) and *Kovidar* (*Bauhinia purpurea* L.) T.S. of stem bark of *Bauhinia variegata* L. shows a wide stratified cork have thin-walled yellow brown cells followed by brown colored cells; inner cork layer has transversely elongated orange brown cells. T.S. of *Bauhinia purpurea* L of shows presence of few layers of cork, Outer layers contains reddish brown content and inner layers are colourless. Its cortex is composed of 10 to 12 layers of parenchyma cell. Total Ash value found in sample of *Kanchnar* was 5.67% and in *Kovidar* was 15.2%. The Alcohol soluble extractive value of *Kanchnar* was found 29.8 % and of *Kovidar* was found 4.8%. Water soluble extractive value in sample of *Kanchnar* was found 20.68% and in *Kovidar* it was found 13.83%. Reference marker betasitosterol and lupeol was applied on a pre-coated silica gel GF_{254} plate of uniform thickness (0.2mm). The mobile phase consisting Toluene: Ethyl acetate: formic acid (9:1:0.1). Presence of marker betasitosterol and lupeol in sample of *Bauhinia variegata* L. were 85.19µg/ml and146.4µg/ml respectively. Presence of marker betasitosterol and lupeol in sample of *Bauhinia purpurea* L. were 244.6µg/ml and 305µg/ml respectively.

INTRODUCTION

Kanchnar (*Bauhinia variegata* Linn.) and *Kovidar* (*Bauhinia purpurea* Linn.) both are important medicinal plants were used in Ayurvedic system of Medicine since a long period. Different species of Bauhinia are known and used as *Kanchnar* in Ayurvedic medicine *Acharya Charak* [1] has mentioned both *Kovidar* and *Karbudar* in *Vamana dravya kalpa sangraha* while *Acharya Sushruta* has placed them under *Urdhva bhaagahara dravya* and he has also placed *Kovidar* in *Kashaya Varga*. *Acharya Chakrapani Datt* had described the difference between *Kovidar* and *Karbudar* on the basis of flowering season. Stem bark of *Kanchnar* was used in disorders like *Gandmala* (lymphadenopathy), *Galaganda* (goitre), *Arbuda* (tumor), *Ashthila* (BPH) and *Kapha–Pitta dosha* disorders while flower have *Pittaghna* (pacify *Pitta dosha*), *Raktapradarghna* (cures dysfunctional uterine bleeding), *Kaasghna* (cures cough), *Kshyaghna* (anti tubercular) properties. Stem bark of *Kovidar* was also used in disorders like *Gandmala, Galgand, Apachi, Arbuda, Vrana, Nadivrana, Granthi, Kushtha, Krimirog, Gudabhransh, Vaman kalp* while flower have therapeutics effect in *Raktpitta, Kshaya, Kaas, Raktpardar.* Various research studies proved anti-diabetic, anti-oxidant, analgesic, anti-dyslipidemia, anti-inflammatory anti-microbial, cytotoxic, anthelmintic properties of *Kanchnar*. The juice of the bark is used in the treatment of amoebic dysentery, diarrhea and other stomach disorders. A paste of the bark is useful in the treatment of cuts and wounds, skin diseases, scrofula and ulcers. It can also be used in cough, asthma, abdominal distention, also act as a

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gargle for sore throats, prevent from skin diseases. It is helpful in managing skin discoloration. *Kovidar* also have anti-diabetic, cytotoxic, fibrolytic, anti-inflammatory, anti-arthritic, anti-diarrheal, anti-microbial activity that is proved by researcher.

MATERIAL AND METHOD

Material: To conduct the study, fresh stem bark of *Kanchnar* (*Bauhinia variegata* L.) and *Kovidar* (*Bauhinia purpurea* L.) was taken from Rajkiyaudhyan Alambag Lucknow, (U.P.) and herbal garden of State Ayurvedic College and Hospital, Lucknow, for comparative study and quality standardization and it was identifying as *Kanchnar* and *Kovidar* by Supervisor and Co-supervisor. After collection of Samples was washed with tap water, cut in slices and dried in shade. Sample packed in polybags and labelled. The dried stem bark of Kanchnar and Kovidar were powdered with mechanical grinder and preserved in an air-tight glass container. After preservation of each sample were symbolized as ***Kanchnar* (*Bauhinia variegata*Linn.)- B.V.,**

***Kovidar* (*Bauhinia purpurea* Linn.)- B.P.**

Methods

Macroscopic study, microscopic study[2], powder microscopy[2], determination of foreign matter[3], physicochemical studies as loss on drying (LOD)/ moisture content[4], determination of total ash value[5], determination of acid insoluble ash value[6], determination of water soluble ash value[7], determination of alcohol soluble extractive value[8], determination of water soluble extractive value[9], qualitative photochemical analysis[10,11] TLC and[12] HPTLC [13]were carried out by standard methods.

In chromatography sample and standard compounds were applied on percolated silica gel $60F_{254}$ HPTLC plate format 100.0 x 100.0mm, using a CAMAG 100µl sample syringe (Hamilton, Switzerland) with an Automated TLC Sampler V (CAMAG, Switzerland) under the control flow of N_2 gas providing delivery speed of 150nl/s from application syringe. These conditions were kept constant throughout the analysis of samples. The linear ascending development was carried out in the developing chamber twin trough chamber. The saturation time of the TLC chamber in the mobile phase was optimized to 30 min for a good resolution of the tested markers and the total run time was 30 min at room temperature (27±2°C). The mobile phase was selected using a various system where in varying ratio and polarity were tried. The mobile phase consisting of Toluene: Ethylacetate: formicacid (9:1:0.1) was optimized for quantitative study. TLC plate was developed up to a distance of 85 mm from the point of application, scanning of the TLC plate was performed using the CAMAG TLC Scanner at single wavelength λ_{max} 450nm in ultraviolet absorbance mode for all track's, slit dimension was 4X0.45mm.

Lupeol and Betasitosterol was quantified using Camag scanner equipped with Camag Visioncat software (slit width, 5mm X 0.45mm) in absorption mode. HPTLC fingerprinting of samples of *Bauhinia variegata* L. (20µl & 30µl applied volume) and *Bauhinia purpurea* L. (15µl & 20µl applied) and reference marker (lupeol -5µl and betasitosterol -5µl, applied volume) was done. Under UV 254nm and UV 366nm wavelength was shows presence of some bands but lupeol and betasitosterol was shown after derivatization with anisaldehyde solution.

OBSERVATION AND RESULTS

Table 1: Organoleptic characters of crude samples of Both Bauhinia species

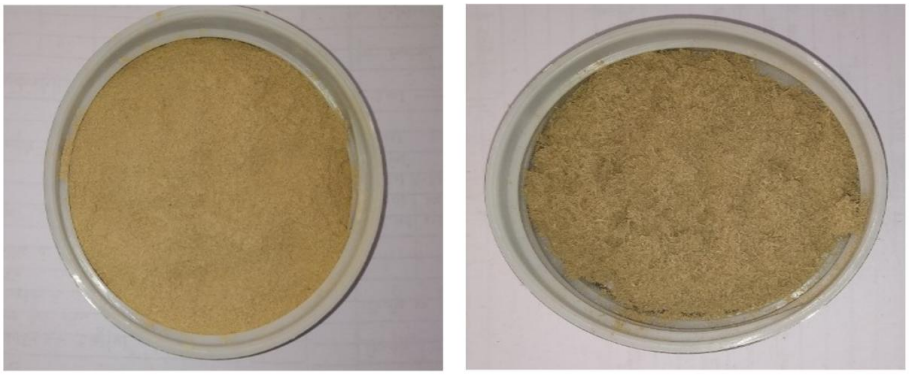
S.No	Parameter	Descriptions of Stem Bark	
		***B. variegata* L.**	***B. purpurea* L.**
1.	Color	Outer surface Brown and reddish, Inner surface white and pinkish.	Outer surface ashy to dark brown, inner surface whitish.
2.	Odour	Characteristic	Characteristic
3.	Taste	Astringent, bitter	less astringent
4.	Texture	Hard, outer surface with small transverse and longitudinal cracks	Hard exfoliating scales. Small transverse and longitudinal cracks.
5.	Touch	Rough	Rough

Fresh stem bark of Kanchnar (B.V.) Fresh stem bark of Kovidar (B.P.)

Fig-1

Dried stem bark of Kanchnar (B.V.) Dried stem bark of Kovidar (B.P.)

Fig-2



Powder of dried stem bark of *Bauhinia variegata* L. Powder of dried stem bark of *Bauhinia purpurea* L.

Fig 3

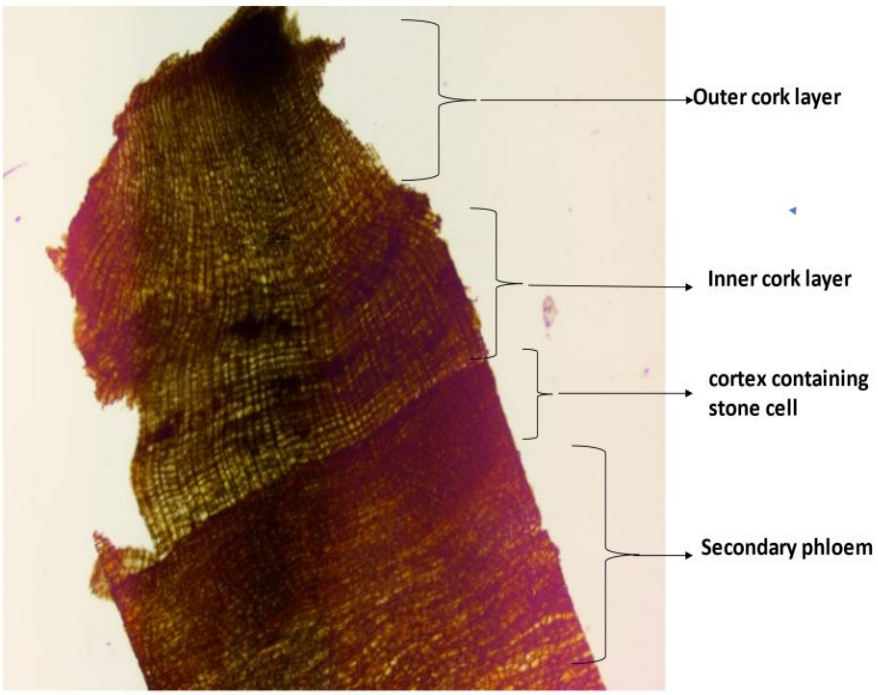
Organoleptic characters of powder of stem bark of both Bauhinia samples

Table 2: Organoleptic characters of powder of both samples

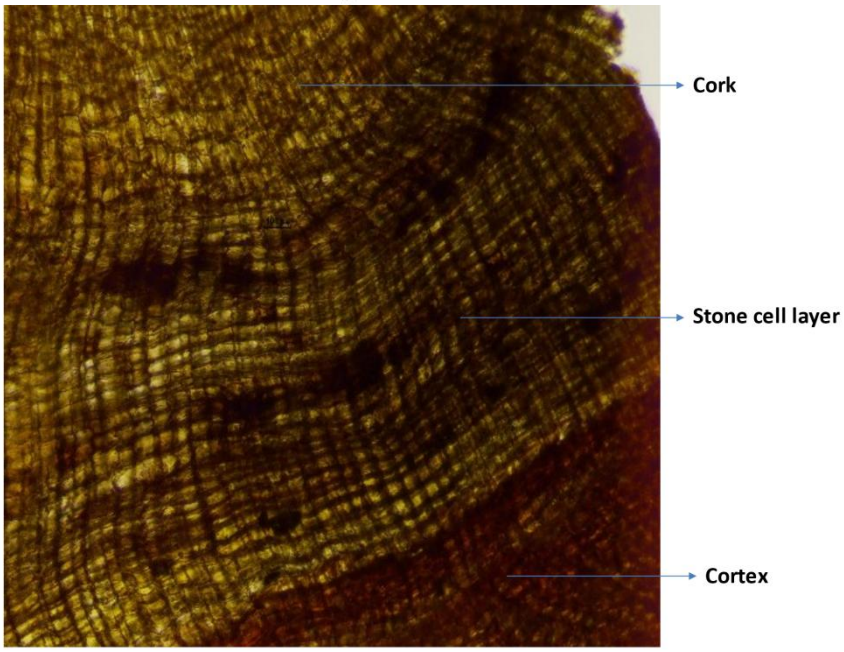
S.No	Parameter	Descriptions of Powder of Stem Bark	
		***B. variegata* L.**	***B. purpurea* L.**
1.	Color	Pinkish	Brownish
2.	Odour	Characteristic	Characteristic
3.	Taste	Astringent	less astringent
4.	Texture	Fine, smooth	Fine, fibrous
5.	Touch	Smooth	Slightly rough

Microscopic study of stem bark of *B. variegata* L.

Transverse section of mature stem bark shows a wide stratified cork, outer cork composed of thin-walled, slightly compressed, yellow brown cells followed by a number of layers of brown coloured cells, inner cork composed of transversely elongated orange brown cells, cork interrupted at certain places due to formation of rhytidoma, some secondary cortex composed of 15 or more rows or transversely elongated to circular, thin-walled, parenchymatous cells, some secondary cortex cells contain orange brown contents, groups of stone cells found scattered in this region occasionally arranged in 1-7 or more tangential rows, pericyclic fibres, thick-walled with narrow lumen, scattered in secondary cortex in singles or in groups, secondary phloem consists of sieve tubes, companion cells, phloem parenchyma and fibres traversed by funnel shaped medullary rays, phloem fibres arranged in radial rows throughout phloem region, prismatic and rhomboidal crystals or calcium oxalate abundantly found in phloem and secondary cortex regions, very rarely found in cork cells, cluster crystals also present in secondary cortex and secondary phloem, crystal fibres also found in secondary phloem.



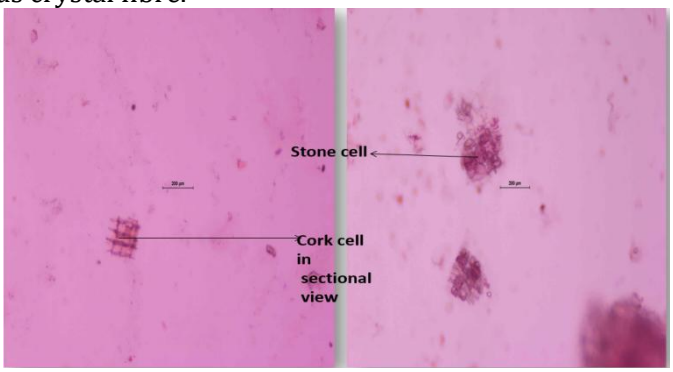
T.S. of stem bark of *Bauhinia variegata* L in 4x resolution



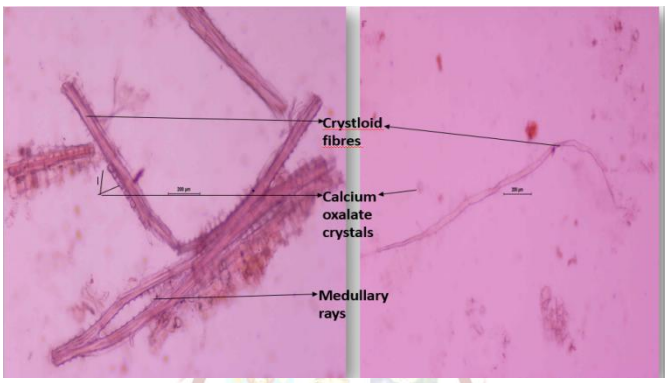
T.S. of stem bark of *Bauhinia variegata* L. in 10X Resolution

Powder microscopy of *B. variegata* L.

Color of powder is pinkish, on observation under microscope showing abundant crystals of calcium oxalate, sclereids in singles or in groups with wide lumen, bits of fibres, cork and secondary cortex cells, containing coloured content, and numerous crystal fibre.



A. **B.**

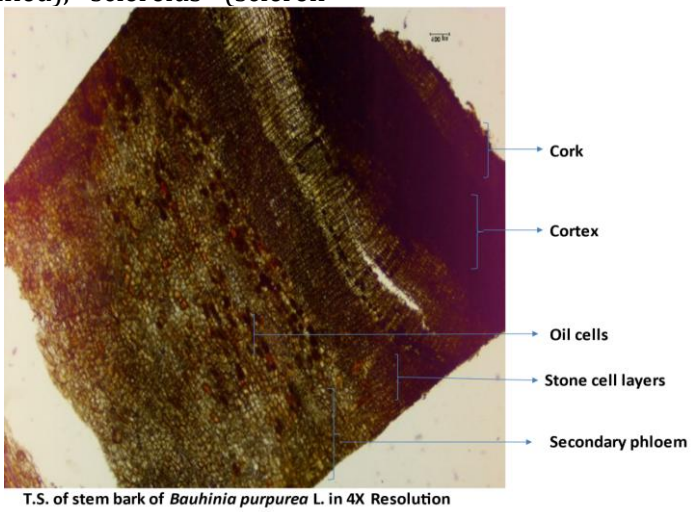


C. **D.**

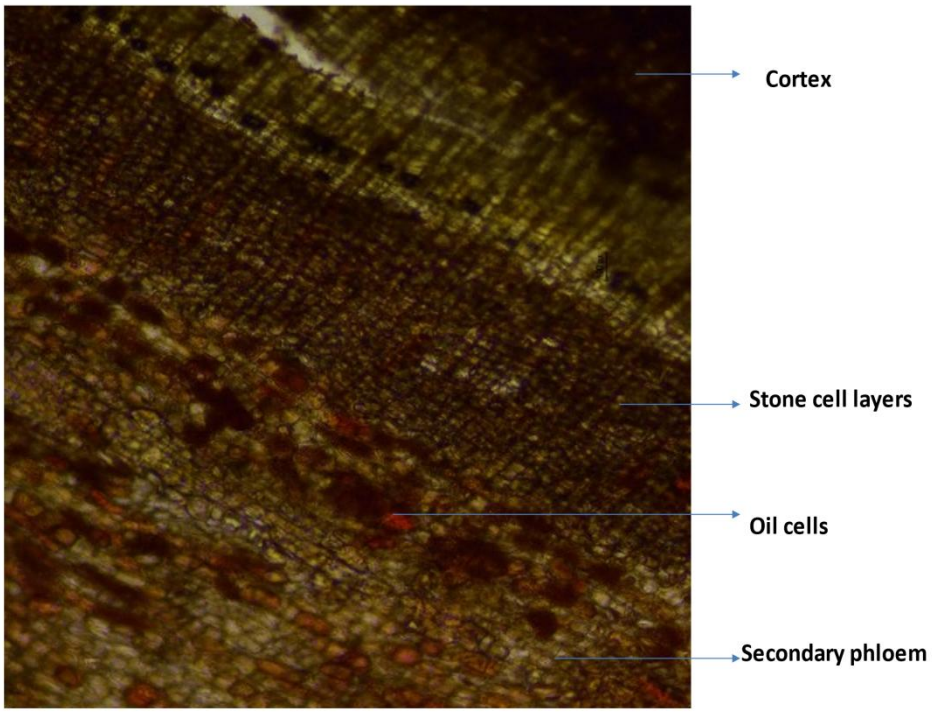
Fig 5: Powder microscopic image of *Bauhinia variegata* Linn in 10 x resolution

Microscopic study of stem bark of *B. purpurea* L.

Microscopic studies of stem bark show the presence of cork (few layers polygonal tabular cells), Outer layers contains reddish brown content and inner layers are colourless. Phellogen and phelloderm are indistinguishable from each other. Cortex is composed of 10 to 12 layers of parenchyma cells. Stone cells are scattered in the middle of parenchyma. Starch grains and Calcium oxalate crystals are found in some parenchyma cell. Stone cell layer (pericyclic) is found in between cortex and secondary phloem. Stone cell, pericyclic fibers (non-lignified), sclereids (sclerenchymatous cells), Medullary rays narrow at inner side, wider in the sclereids band side, contains starch, acicular raphides and oil cells was found to be big–isolated. Secondary phloem composed of phloem parenchyma, phloem fibers and medullary rays. Phloem parenchyma is composed of parenchyma cells containing starch grains and calcium oxalate crystals. Medullary rays traverse radially the phloem parenchyma, 1-3 cell wide and extend upto stone cell layer.



T.S. of stem bark of *Bauhinia purpurea* L. in 4X Resolution



T.S. of stem bark of *Bauhinia purpurea* L. 10 X Resolution

Powder microscopy of *B. purpurea* L.

Color of powder is yellowish brown. On observation under microscope it shows sclerenchymatous fibers, parenchymatous cells, starch grains and abundant calcium oxalate crystals, medullary rays, cork cells, crystaloid fibers.

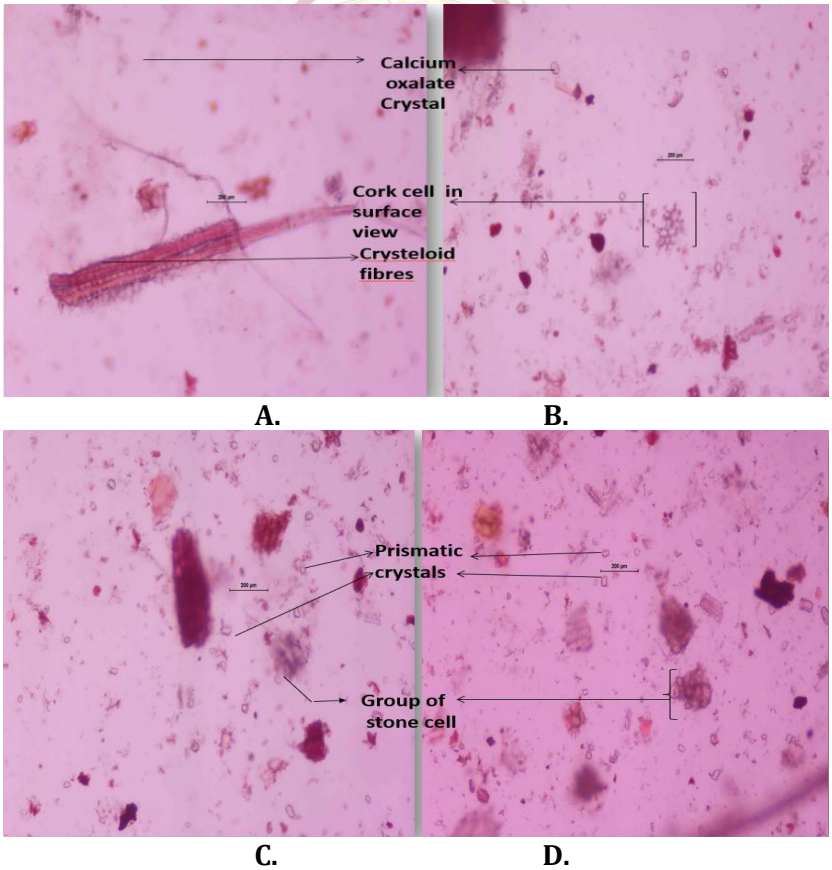


Fig 7: Powder microscopic image of *Bauhinia purpurea* Linn in 10x resolution

Table 3: Physiochemical Analysis

S.N.	Physiochemical parameters	St.Bk. of *B. P.*	St.Bk. of *B.V.*	St. Bk. of *B.V.* mentioned in API
1.	Foreign matter	0%	0%	Not more than 2 %
2.	Acid-insoluble ash	0.89%	0.14 %	Not more than 0.2%
3.	Total Ash	15.2%	5.67%	Not more than 11 %
4.	Alcohol-soluble extractive	4.8%	29.8 %	Not less than 2 %
5.	Water soluble extractives	13.83%,	20.68%	Not less than 6%

Table 4: Phytochemical Screening

S.No.	Phytochemical tests	*B. variegata* L.		*B. purpurea* L.	
		ME	AE	ME	AE
A.	**Alkaloid Test**				
1.	Hager's Test	**+ve**	**+ve**	**+ve**	**+ve**
2.	Wagner's Test	**-ve**	**-ve**	**+ve**	**+ve**
B.	**Carbohydrate Test**				
1.	Molisch's Test	**+ve**	**+ve**	**+ve**	**+ve**
2.	Fehling's Test	**-ve**	**-ve**	**+ve**	**+ve**
3.	Benedict Test	**+ve**	**-ve**	**+ve**	**+ve**
C.	**Protein and Amino acids**				
1.	Biuret Test	**+ve**	**-ve**	**+ve**	**+ve**
2.	Ninhydrin Test	**+ve**	**+ve**	**+ve**	**+ve**
D.	**Phenolic compound**				
1.	Ferric chloride Test	**+ve**	**+ve**	**+ve**	**-ve**
2.	Gelatin Test	**+ve**	**-ve**	**+ve**	**-ve**
E.	**Flavonoid Test**				
1.	Shinoda Test	**+ve**	**+ve**	**+ve**	**+ve**
F.	**Fixed oils and Fats**				
1.	Spot Test	**-ve**	**-ve**	**+ve**	**-ve**
G.	**Tannins**				
1.	5% $feCl_3$	**+ve**	**+ve**	**WP**	**WP**
H.	**Saponins**				
1.	Foam Test	**+ve**	**+ve**	**+ve**	**-ve**
I.	**Steroids**				
1.	Salkowski Test	**-ve**	**-ve**	**+ve**	**-ve**
J.	**Terpenoids**				
1.	Libarman-Burchard Test	**-ve**	**-ve**	**+ve**	**-ve**

ME=Methnolic Extract, AE= Aqueous Extract, +ve=positive for test, -ve= Negative for test, WP=Weakly positive

HPTLC Analysis

Table 5: Rf values of different bands of Both samples in HPTLC

Track	No. of bands	Rf values	Rf of BS in sample	Rf of Lup in sample	Rf of Ref. BS	Rf of Ref. Lup
Track 1. BVch 20µl	7	0.013, 0.162, 0.603, 0.667, 0.790, 0.905, 0.963	0.603	0.79	0.61	0.81
Track 3. BPch 15µ	9	0.015, 0.300, 0.460, 0.503, 0.590, 0.673, 0.788, 0.900, 0.953	0.590	0.788	0.61	0.81

Table 6: HPTLC result, presence of lupeol and beta sitosterol in both samples

Sample	Lupeol (Lup)	Betasitosterol (BS)
Bauhinia variegata L. (BVch)	146.4 µg/ml	85.19 µg/ml
Bauhinia purpurea L. (BPch)	305 µg/ml	244.6 µg/ml

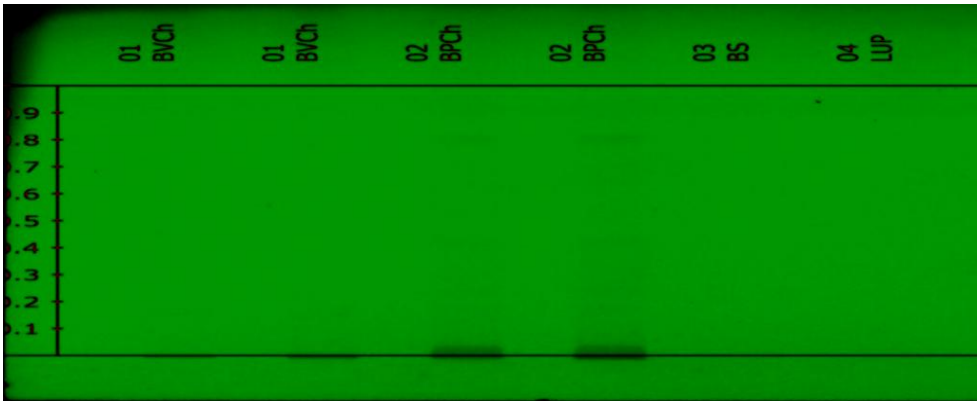


Fig 8: HPTLC Plate under UV 254 nm

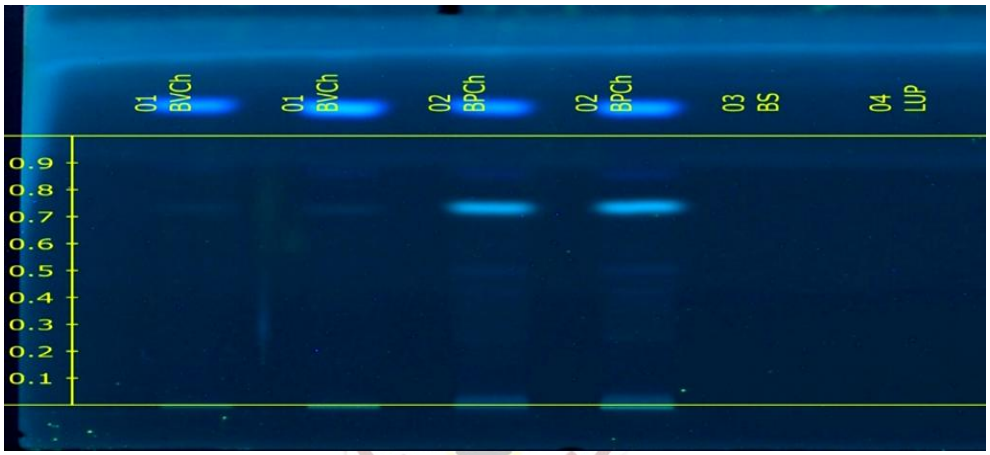


Fig 9: HPTLC Plate under UV 366 nm

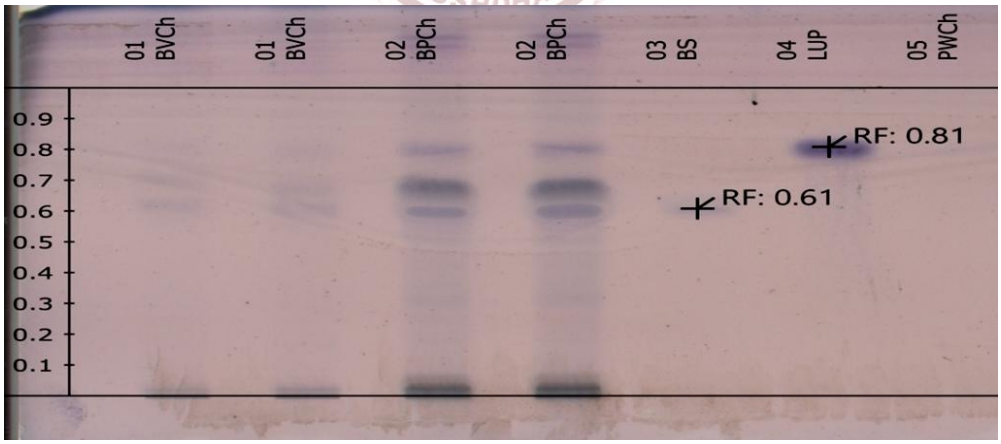


Fig 10: HPTLC Plate under Day light after derivatization

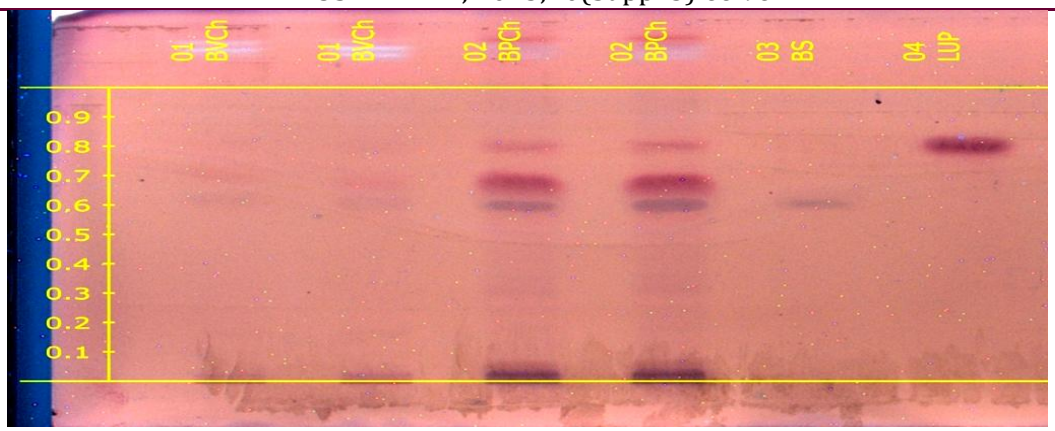


Fig 11: HPTLC Plate under UV 366nm after Derivatization

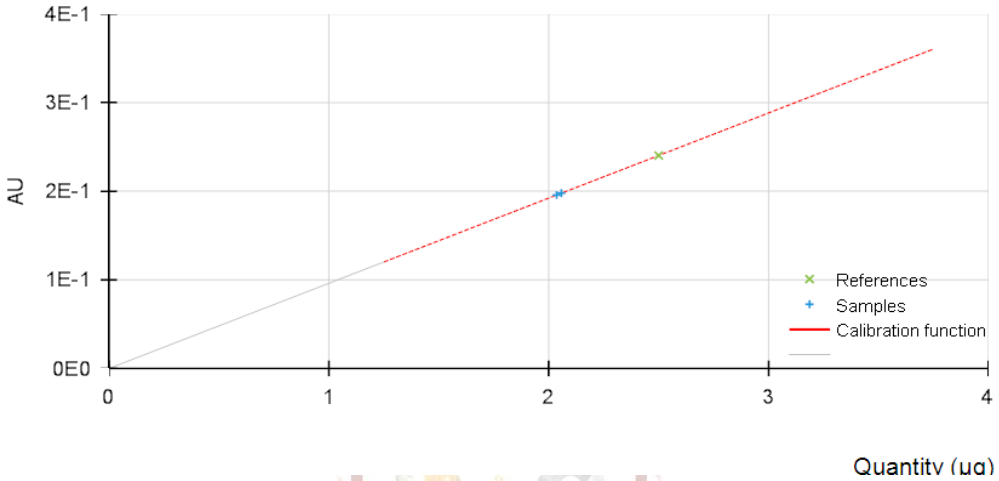


Fig 12: Height calibration for Betasitosterol @550nm

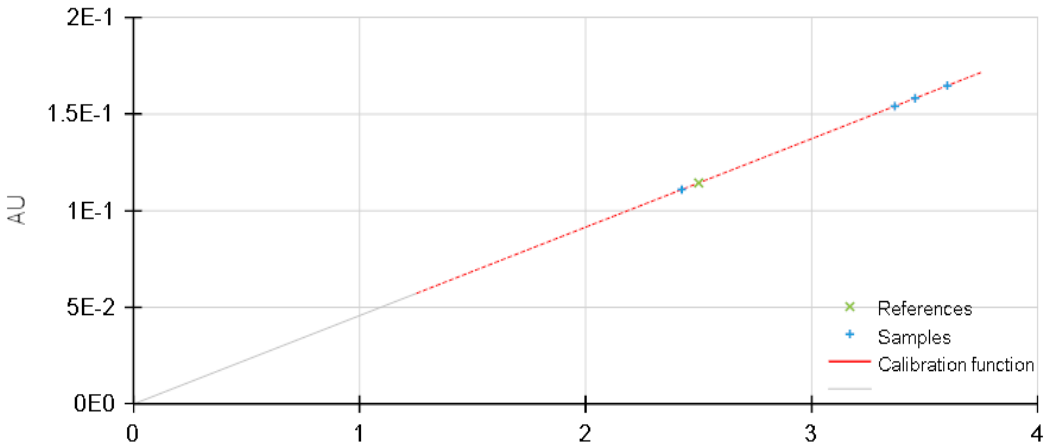


Fig 13: Height calibration for Lupeol @550nm

DISCUSSION

On examination of crude samples of stem bark of B.V. and B.P. externally. Outer surface of stem bark of B.V. has brown and reddish color and inner surface has white and pinkish color. The color of outer surface of B.P. sample has outer surface ashy to dark brown in color and inner surface has whitish color. Both samples B.P. and B.V. have characteristics odour. The sample of B.V. has bitter and astringent taste and sample of B.P. has comparatively less astringent in taste. Texture of B.V was hard, outer surface have small transverse and longitudinal cracks and texture of B.P. also hard, has exfoliating scales, small transverse and longitudinal cracks. Both are tough on touch. The powdered sample of B.V. has slight pinkish color and of B.P. has brownish color. Both samples have characteristic odour. The powdered sample of B.V. has astringent taste and of B.P. has less astringent taste. The samples of B.V. have fine and smooth in texture, sample of B.P. have fine and fibrous in texture. By touching sample of B.V. feels smooth and of B.P. feels slightly rough.

In microscopic study T.S. of stem bark of B.V. shows a wide stratified cork, outer cork layer has compressed thin-walled yellow brown cells followed by brown colored cells; inner cork layer has transversely elongated orange brown cells. T.S. of B.P. shows presence of few layers of cork, Outer layers contains reddish brown content and inner layers are colourless. T.S. of B.V. shows secondary cortex composed of 15 or more rows or transversely elongated to circular, thin-walled, parenchymatous cells, secondary cortex cells contain orange brown contents, groups of stone cells found scattered arranged in 1-7 or more tangential rows, pericyclic fibres, thick-walled with narrow lumen, scattered in secondary cortex in singles or in groups. T.S. of B.P. shows its cortex is composed of 10 to 12 layers of parenchyma cells, stone cells are scattered in the middle of parenchyma. Starch grains and Calcium oxalate crystals are found in some parenchyma cell, stone cell, pericyclic fibers (non-lignified), sclereids (sclerenchymatous cells), medullary rays narrow at inner side, wider in the sclereids band side, contains starch, acicular raphides and oil cells was found to be Big –isolated.

Powder microscopy of B.V. showing abundant crystals of calcium oxalate, sclereids in singles or in groups with wide lumen, bits of fibres, cork and secondary cortex cells, containing coloured content, and numerous crystal fibres. Under microscope powder of B.P. shows sclerenchymatous fibers, parenchymatous cells, starch grains and abundant calcium oxalate crystals, medullary rays,cork cells, crystaloid fibers.

Moisture content of crude drug is related to its stability and consequently with the shelf life of crude drug. *Bauhinia variegata* L. have 8.71% moisture content, whereas *Bauhinia purpurea* L. have 7.55% moisture content.

The total Ash value method is design to measure the total amount of material remaining after ignition. This include both physiological ash which derived from the plant itself and non-physiological ash which is the residue of the extraneous matter (eg. sand and soil) adhering to plant surface. According to API (*Kanchnar* API part I vol. 1) Total Ash valueof *Kanchnar* should not be more than 11%. Total Ash value found in sample of *Kanchnar* was 5.67% and in *Kovidar* was 15.2%. *Kovidar* has higher value of ash content in comparison to *Kanchnar.*

The acid insoluble ash content indicates the presence of siliceous matter. Acid insoluble ash content found in *Kanchnar* was 0.14% and in *Kovidar* was 0.89%. It signifies that *Kovidar* has more siliceous matter in comparision to *Kanchnar*. In API limit value of acid insoluble ash of *Kanchnar* was mentioned as not more than 0.2%.

Water insoluble ash value is useful in determining authenticity and purity of sample and also these values are important qualitative standards. Limit of water insoluble ash of *Kanchnar* in API has not mentioned. Water insoluble ash value of *Kanchnar* was found 2.14%, and of *Kovidar* was found 9.63%. It means that *Kovidar* has more water insoluble ash content as compare to *Kanchnar.*

The extractive values was done in 3 solvents; alcohol, water and methanol. Limit of alcohol soluble extractive value of *Kanchnar* in API should be not less than 2%. The alcohol soluble extractive value of *Kanchnar* was found 29.8% and of *Kovidar* was found 4.8%. *Kanchnar* have more alcohol soluble extractive value than *Kovidar* means that *Kanchnar* have more alcohol soluble active compounds. Limit of water-soluble extractive value of *Kanchnar* in API should not be less than 6%. Water soluble extractive value in sample of *Kanchnar* was found 20.68% and in *Kovidar* it was found 13.83%. *Kanchnar* have more water-soluble extractive value content in comparison to *Kovidar*, this indicates that *Kanchnar* have more water-soluble active constituents than *Kovidar*.

Identification of phytochemicals indicates pharmacological active metabolites present in the plant. Phytochemical screening of aqueous extract and Methanolic extract samples of *Kanchnar* revealed the presence of Alkaloid, carbohydrate, protein and amino acid, phenolic compound, flavonoids, tannin, saponin. Phytochemical screening of methanolic extract of *Kovidar* revealed the presence of carbohydrate, alkaloid, protein, phenolic compound, flavonoid, fixed oil and fat, tannin (weakly positive), saponin, Steroid, terpenoid. Aqueous extract of *Kovidar* revealed the presence of alkaloid, carbohydrate, protein, amino acid, flavonoid and tannin (weakly positive)

HPTLC fingerprinting of samples of *Bauhinia variegata* L. (20µl *&* 30µl applied volume) and *Bauhinia purpurea* L. (15µl & 20µl applied) and reference marker (5µl, & 5µl, applied volume) was done. Marker Lupeol and Betasitosterol was quantified using Camag scanner equipped with Camag Visioncat software in absorption mode. The mobile phase consisting Toluene: Ethyl acetate: formic acid (9:1:0.1) of was optimized for quantitative study. Under UV 254nm and UV 366 nm wavelength plate was observed but presence of marker Lupeol and Betasitosterol was observed after derivatization of plate by Annisaldehyde reagent. On scan under 500nm, 550nm, 600nm wavelength, different colored band was observed. maximum band was observed in 550nm wavelength. Reference marker Betasitosterol

was marked at Rf 0.61 and Lupeol was observed at Rf 0.81.

Total 7 bands of different colours were observed in UV 366nm after derivatization in applied sample of *Bauhinia variegata* (BVch). Total 9 bands of different colours were observed in UV 366nm after derivatization in applied sample of *Bauhinia purpurea* L. (BPch). Presence of Marker Betasitosterol and Lupeol in sample of *Bauhinia variegata* L. were 85.19µg/ml and 146.4µg/ml respectively. Presence of marker BetasitosterolandLupeol in sample of *Bauhinia purpurea* L. were 244.6µg/ml and 305µg/ml respectively

CONCLUSION

For identification of stem bark of *Kanchnar* and *Kovidar* all standard parameters were used to establish identity, purity and strength of both species mentioned in API. On pharmacognostical evaluation it was observed that sample of *Kanchnar* (*Bauhinia variegata* Linn) full fills the parameters of *Kanchnar* mentioned in API Part- I, Volume – I at serial number 36, page no. 56. But authentic parameter of *Kovidar* have not mentioned there.

Ash values are used to determine quality and purity of crude drug. It indicates presence of various impurities like carbonate, oxalate and silicate *Kovidar* has higher value of ash content in comparison to *Kanchnar* means that *Kovidar* have more carbonate, oxalate and silicate like impurities than *Kanchnar*. The acid insoluble ash content indicates the presence of siliceous matter. *Kovidar* has more siliceous matter in comparison to *Kanchnar.*

Estimation of extractive values determines the amounts of active constituents in a given amount of plant material when extracted with a particular solvent. *Kanchnar* have more alcohol soluble extractive value than *Kovidar,* means that *Kanchnar* have more alcohol soluble active constituents as compare to *Kovidar*. *Kanchnar* have more water-soluble extractive value in comparison to *Kovidar*, this indicates that *Kanchnar* have more water-soluble active constituents than *Kovidar*.

Phytochemical screening of aqueous extract and methanolic extract samples of *Kanchnar* revealed the presence of alkaloid, carbohydrate, protein and amino acid, phenolic compound, flavonoids, tannin, saponin. Phytochemical screening of Methanolic extract of *Kovidar* revealed the presence of carbohydrate, alkaloid, protein, phenolic compound, flavonoid, fixed oil and fat, tannin (weakly positive), saponin, steroid, terpenoid. Aqueous extract of *Kovidar* revealed the presence of alkaloid, carbohydrate, protein, amino acid, flavonoid and tannin (weakly positive). *Kanchnar* and *Kovidar* have approximately similar phytochemicals. Similar phytochemical would have similar therapeutic effects.

HPTLC study is the key of pharmacognostical evaluations. HPTLC was done along with identification marker Lupeol and Bitasitosterol. On scanning of HPTLC plate under UV 360nm and after derivatization of plate different bands of different color was observed. *Kanchnar* shows 7 bands of different Rf values and *Kovidar* 9 bands of different Rf values. Reference marker Betasitosterol was marked at Rf 0.61 and Lupeol was observed at Rf 0.81. On the basis of physiochemical parameters, I can conclude that stem bark of *Kanchnar* is more potent medicinal plant part as compare to stem bark of *Kovidar,* because *Kovidar* have more ash value and less extractive values as compare to *Kanchnar.*

In phytochemical screening I observed that *Kovidar* have approximately similar phytochemicals as compared to *Kanchnar.* Because of similar phytochemicals, *Kovidar* can be used as substitute of *Kanchnar*, if it is not available. Availability of *Kanchnar* is less in surrounding area, but *Kovidar* is easily available in our surroundings. But comparative clinical study of both species is necessary to establish clinical efficacy and safety of both species in particular disease.

Present time needs attention and promotion of medicinal plant cultivation, for authentic and quality raw material. That is necessary for its long-term stability and prevention of adulteration and substitution.

This research is a time bound short-term study and has its own limitations like budget, time and availability of all kind of resources. It is humbly suggested that an extended comparative pharmacognostical evaluation, experimental study, clinical study of both Bauhinia species in particular disease to find out therapeutic effect etc. are necessary research work to establish identification and therapeutic action of both species are required.

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