

Pharmacognostic Studies on Stem Bark of *Oroxylum Indicum*

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Abstract:- *Oroxylum Indicum* Linn., also known as Broken bones plant belongs to the family- Bignoniaceae. The root of the *Oroxylum Indicum* is known to improve appetite and can be used as a tonic. It is useful in reducing fever, inflammation of respiratory system and emesis. Moreover, it also possesses aphrodisiac, anti-diarrhoeal and anti-rheumatic activity. In tribal places of India the seeds and barks of this plant are used for treating respiratory disorders like pneumonia, to reduce elevated temperature and other respiratory disorders. They are also believed to provide relief from abdomen related diseases. Various studies have reported its anti-inflammatory, anti-helmenthic, anti-cancerous, anti-microbial, anti-oxidant activity. The present investigation includes macroscopy, microscopy, preliminary phytochemical screening, physicochemical evaluation and HPTLC fingerprinting of the stem bark of the plant.

Keywords:- *Oroxylum Indicum*, Pharmacognosy.

I. INTRODUCTION

India has a unique position in the world, where a number of recognized indigenous systems of medicine viz., Ayurveda, Siddha, Unani, Homeopathy, etc., are being employed for well being of people. Medicinal herbs, the source materials for these remedies are readily available and are cost-effective. No doubt that the herbal drugs are popular among rural and urban community of India (Sheth, 2005). Several plants are currently being screened and evaluated by the research scientists for their potential in for management of various ailments. In the current study, the stem bark of *Oroxylum Indicum* is evaluated pharmacognostically.

Oroxylum Indicum Vent. (L.) is a small-medium sized deciduous tree with soft light brown or grayish brown bark, leaves very large, 2-3 pinnate with 5 or more pairs, leaflets 2-4 pairs ovate or elliptical, acuminate and glabrous. Flowers are reddish purple outside, dull or pale pinkish yellow within. Fruits are flat capsules, upto 1m long, sword shaped. Seeds are flat and winged with papery wings (Warrier *et al.*, 1995; Khare, C.P., 2004, bioinfo.bisr.res.in). In India, it is distributed in Himalayan foothills, Eastern and Western Ghats and North East India (Jayaram & Prasad, 2008).

The bark, stem and root of the *Oroxylum Indicum* are mentioned in ayurveda for the beneficial effects in treating snake bite (Panda *et al.*, 2011). Leaves of this plant are also

equally important and are used for treating infections. They are also helpful in treating ulcers and in relieving headache, thus acting as an analgesic herb (Panghal *et al.* 2010). In tribal places of India the seeds and barks of this plant are used for treating respiratory disorders like pneumonia, to reduce elevated temperature and other respiratory disorders. They are also believed to provide relief from abdomen related diseases (Patil *et al.*, 2008). Fruits help in relieving the symptoms of heart and throat disorders, mainly the inflammation of bronchi and thus can be used as expectorant (Waseem *et al.*, 2012). They can also be used to treat white patches on skin (Panda *et al.*, 2011). Moreover, the fruits are also used in anorexia (Chopra *et al.*, 2002).

➤ Synonyms

Bignonia Indica, Spathodea Indica, Calosanthes Indica, Hippoxylon Indica, Bignonia Quadripinnata.

➤ Vernacular names

- English:- Broken bones plant
- Sanskrit:- Shyonaka
- Hindi:- Bhut-vriksha
- Malayalam:- Aralu

II. MATERIALS & METHODS

➤ Procurement of Plant Materials

The stem bark of *Oroxylum Indicum* was collected from Borivali National Park, Mumbai. The plant was taxonomically authenticated at Herbarium, National Botanical Research Institute, Lucknow, India (Voucher no.: LWG Acc. no. 97372).

➤ Macroscopic Evaluation

Macroscopic characters like colour, odour, taste, fracture and size were studied.

➤ Microscopic Evaluation

Microscopic evaluation was carried out by taking transverse sections of fresh bark using razor blade; few sections were stained with safranin. Microscopic characteristics of the stained and unstained sections were observed under microscope.

➤ Physicochemical Evaluation

Physicochemical properties of stem bark of *Oroxylum Indicum* were evaluated as per Indian Pharmacopoeia 2010. Parameters such as foreign organic matter, ash values, extractive value (water, alcohol and hydro-alcoholic {1:1} extractive value) and loss on drying were carried out.

➤ Preliminary Phytochemical Evaluation

Aqueous, hydroalcoholic and alcoholic extracts for phytochemical analysis were prepared from the powdered bark of *O.Indicum*. The aqueous and hydroalcoholic (water:alcohol = 1:1) extract were prepared by double maceration technique, where 500g of powdered bark was macerated with 5L of solvent for 7 days, was then filtered; the residue was again macerated for 7 days, filtered again and both the filtrates were mixed, then evaporated using rotary vacuum evaporator and stored in air-tight container in refrigerator till further use. Alcoholic extract was prepared using Soxhlet apparatus. 500 g of powdered crude drug was packed in Soxhlet and was extracted with ethanol. Ethanol was evaporated using rotary vacuum evaporator. Extract was stored in refrigerator till further use. For the tests, each extracts were dissolved in methanol and filtered. The filtrates were then tested as per Gokhale *et al.*, 2011.

➤ HPTLC Fingerprinting

HPTLC fingerprinting of the plant extracts (aqueous, alcoholic and hydroalcoholic) were developed using DESEGA (Germany) HPTLC system and the densitometric scanning was performed at visible, 254 & 366 nm using TLC scanner DESEGA CD60 and ProQuant software.

III. RESULTS

➤ Macroscopic Study of the Stem Bark

Mature dried stem bark showed following features:

- Size: Varies, 0.5 – 1 cm in thickness
- Shape: curved
- Outer surface: rough, buff to blackish in colour
- Inner surface: longitudinally striated, yellowish to yellowish-green in colour
- Fracture: coarse
- Odour: odourless
- Taste: slightly astringent



Fig 1:- Stem Bark of *Oroxylum Indicum*; A: Inner Surface, B: Outer Surface

➤ Microscopic features of *Oroxylum Indicum* bark

The transverse section of mature stem bark of *Ficus asperima* shows the following features;

- The phellum is well developed, many layered and few cells are lignified.
- Phellum is followed by 8-10 layered phellogen, compactly arranged tangentially elongated cells.
- Phelloderm cells are radially arranged. Stone cells are embedded in this region.
- Secondary phloem show plenty of stone cells which are highly lignified and appear in patches. Mutiseriate medullary rays contain minute starch grains and acicular calcium oxalate crystal.

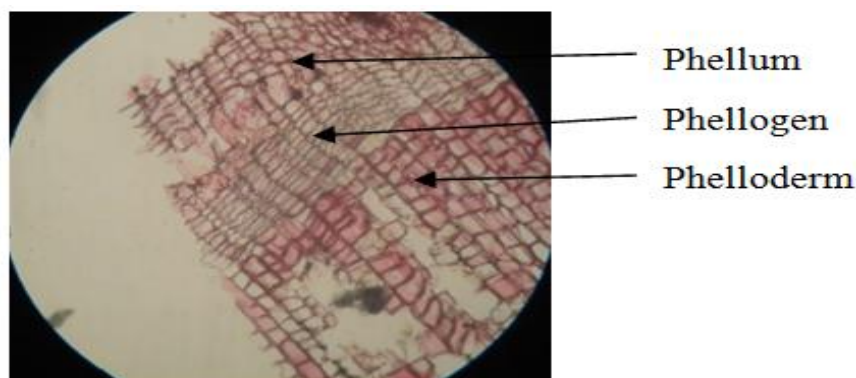


Fig 2:- Transverse Section of *Oroxylum Indicum* Stem Bark Showing Phellum, Phellogen and Phelloderm (100x)

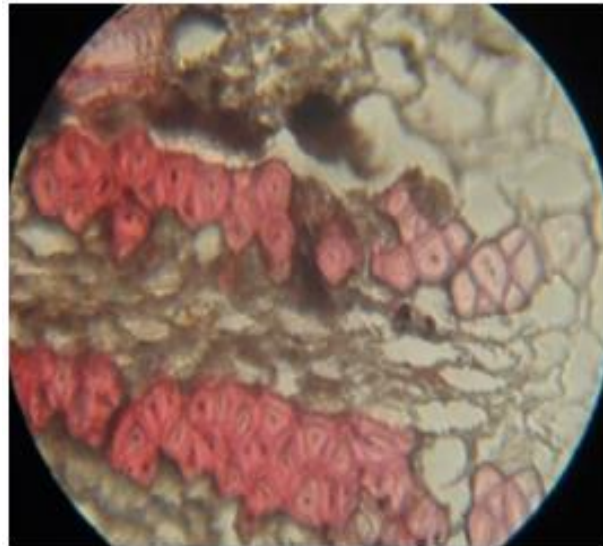
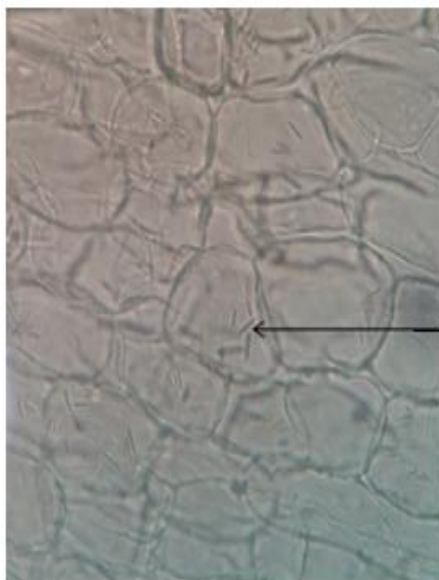
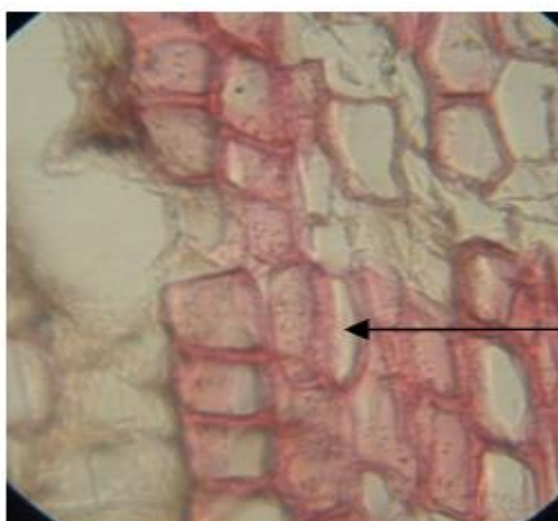


Fig 3:- Transverse Section Showing Stone Cell Patches in Phelloderm Region (450x)



Acicular Ca oxalate crystals

Fig 4:- Transverse Section Showing Acicular Calcium Oxalate Crystals (450x)



Starch grains

Fig 5:- Transverse Section Showing Minute Starch Grain in Multiseriate Medullary Ray (450x)

➤ *Physicochemical Evaluation*

The results of the physicochemical evaluation of the powdered bark of *Oroxylum Indicum* have been summarized in the Table 1.

Parameter	Results
Foreign organic matter	Foreign matter content of raw material was found to be less than 0.5 gm/ 100 gm dried sample.
Ash values	
a. Total ash	18.34 ± 0.84 (% w/w)
b. Acid insoluble ash	2.63 ± 0.121 (% w/w)
Solvent extractive values	
a. Water-soluble extractive value	13.5 ± 0.76 (% w/w)
b. Alcohol soluble extractive	3.88 ± 0.91 (% w/w)
c. Hydroalcoholic soluble extractive	13.60 ± 0.62 (% w/w)
Loss on drying	14.22 ± 0.61 (% w/w)

Table 1:- Physicochemical Evaluation of *Oroxylum Indicum*

➤ *Phytochemical Evaluation*

The table below reveals the results of the qualitative analysis of phytochemical constituents of the stem bark of *Oroxylum Indicum*.

Sr. No.	Phytochemicals	Aqueous extract	Hydroalcoholic extract	Alcoholic extract
1	Carbohydrates	+	+	+
2	Saponins	-	-	-
3	Glycosides	+	+	+
4	Flavonoids	+	+	+
5	Alkaloids	+	+	+
6	Steroids	-	-	-
7	Phenolic Compounds	+	+	+
8	Tannins	-	-	-

Table 2:- Phytochemical Evaluation of the Extracts of *Oroxylum Indicum*

➤ *HPTLC Fingerprinting*

- Aqueous extract of *Oroxylum Indicum* bark - The result of HPTLC of the aqueous extract of the bark of *O.Indicum* can be seen in the figure 6 visualized under visible, 254nm and 366nm. Figure 7 depicts the densitogram of aqueous extract of *Oroxylum Indicum* showed four peaks in densitogram at Rf value of 0.41, 0.61, 0.71 and 0.83.

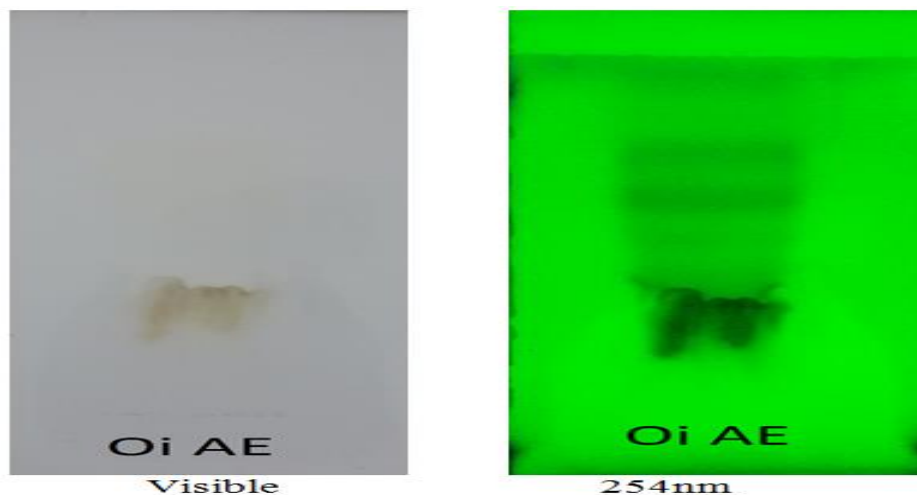


Fig 6:- HPTLC of Aqueous Extract of *Oroxylum Indicum* Bark

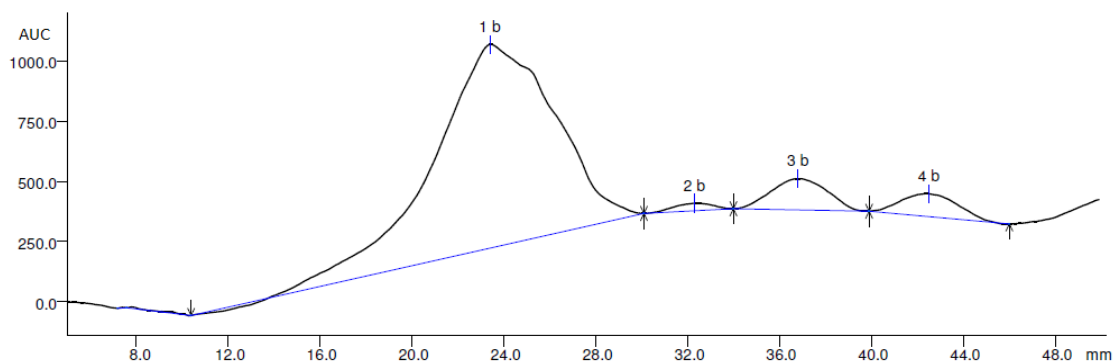


Fig 7:- HPTLC Densitogram of Aqueous Extract of *Oroxyllum Indicum* Bark

- Hydroalcoholic extract of *Oroxyllum Indicum* bark - The developed HPTLC plates of the hydroalcoholic extract of *O.Indicum* can be seen in figure 8, while the figure 9 depicts the densitogram. Peaks at Rf value of 0.30, 0.44 and 0.58 were seen in the densitogram.

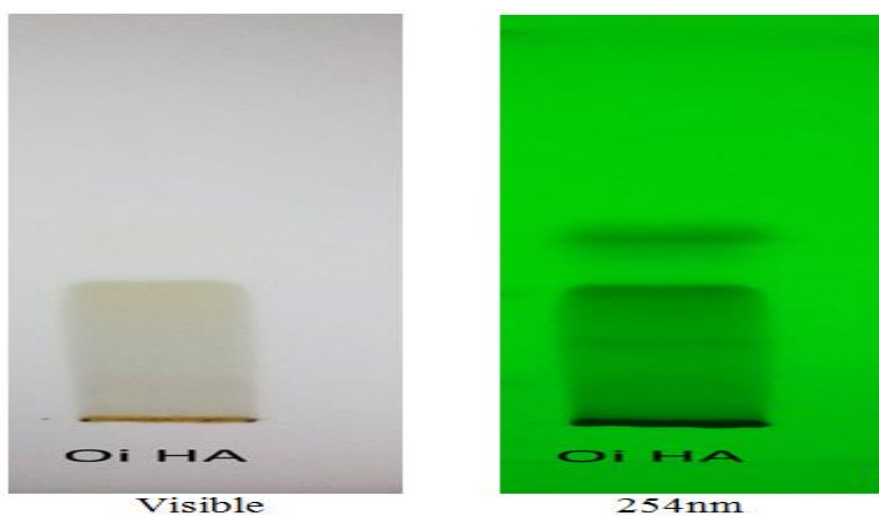


Fig 8:- HPTLC of Hydroalcoholic Extract of *Oroxyllum Indicum* Bark

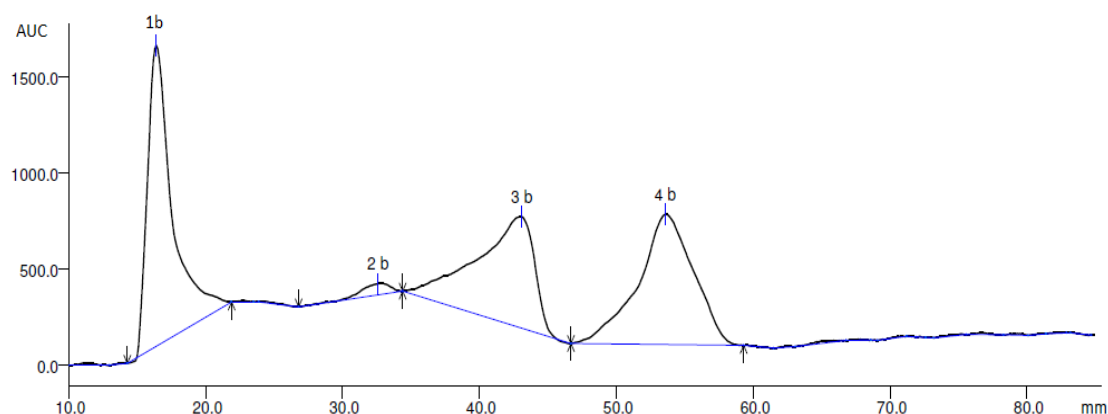
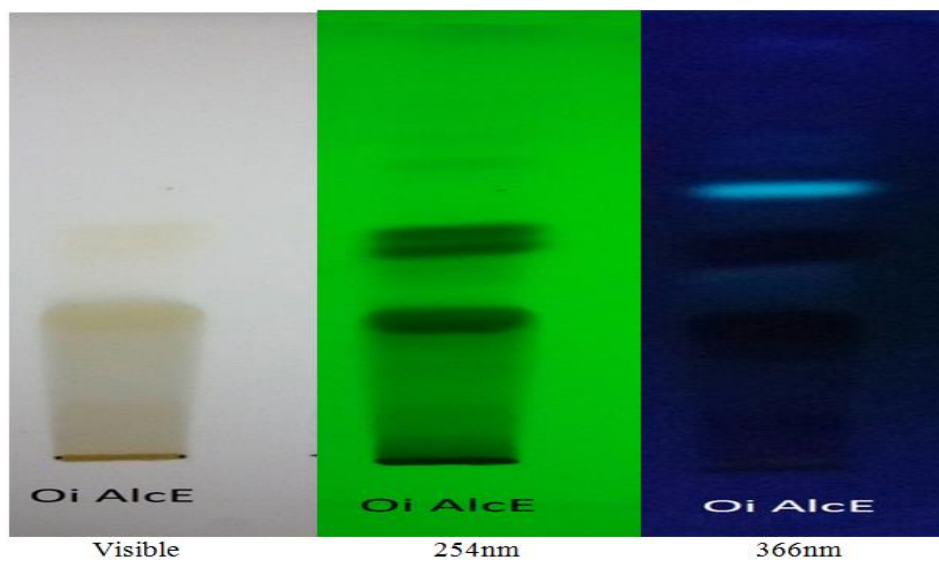
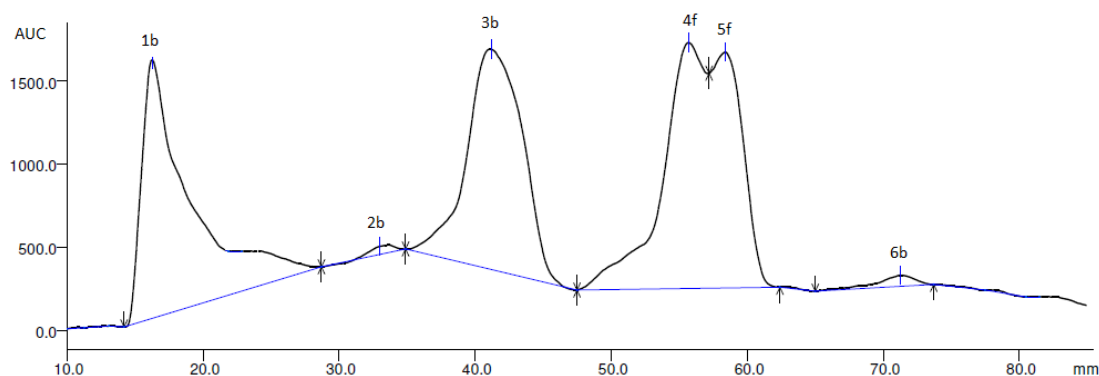


Fig 9:- HPTLC Densitogram of Hydroalcoholic Extract of *Oroxyllum Indicum* Bark

- Alcoholic extract of *Oroxyllum Indicum* bark - The figure 10 shows the developed HPTLC of the alcoholic extract of *O.Indicum* and figure 11 shows densitogram of the same. The plates showed prominent bands and peaks were seen in densitogram at Rf value of 0.31, 0.42, 0.61, 0.65 and 0.82.

Fig 10:- HPTLC of Alcoholic Extract of *Oroxyllum Indicum* BarkFig 11:- HPTLC Densitogram of Alcoholic Extract of *Oroxyllum Indicum* Bark

IV. DISCUSSION

Macroscopic and microscopic analysis of both the plants are concurrent with the previous works done by A. Bisht *et al.* (2011), B.N Tripathy *et al.* (2011) and L. G Radhika *et al.* (2011). Previous work on physicochemical evaluation of *Oroxyllum Indicum* by Bisht *et al.* (2011) has reported the total ash value as 17.38% and acid-insoluble ash value of 2.34%, while loss on drying has been 18.91%. Aparna *et al.*, 2013 have stated the water soluble extractive value and alcohol soluble extractive value, to be 27.48% and 12.45% respectively. In the current study of *O. Indicum*, the total ash value and acid insoluble ash value have been $18.34 \pm 0.84\%$ and $2.63 \pm 0.21\%$ respectively. The hydroalcoholic extractive value has been $13.60 \pm 0.62\%$, while the water and alcoholic soluble extractive value are $13.5 \pm 0.76\%$ and $3.88 \pm 0.91\%$ respectively.

Preliminary phytochemical screening of the extracts gives an idea about the active constituents present in the plants. Phytochemical analysis of the plant is concurrent with the previous works (A. Bisht *et al.*, 2011; B.N Tripathy *et al.*, 2011; L. G Radhika *et al.*, 2011). In current study, *Oroxyllum Indicum* stem bark have shown presence of alkaloids, carbohydrates, glycosides, flavonoids and

phenolic compounds; while saponins, steroids and tannins are absent. HPTLC studies done by Radhika *et al.* (2011) on *O. Indicum* revealed bands at Rf 0.84, 0.52, 0.68, 0.84, 0.32 and 0.9. In the current HPTLC study of *O. Indicum*, the aqueous extract has revealed shows peaks at Rf 0.41, 0.61, 0.71 and 0.83; while alcoholic and hydroalcoholic extract show peaks at Rf 0.31, 0.42, 0.61, 0.65, 0.82 and 0.30, 0.44, 0.58 respectively.

V. CONCLUSION

Macroscopically, *Oroxyllum Indicum* bark is buff-blackish coloured externally and internally is longitudinally striated, yellow to yellowish-green in colour. The fracture is of coarse type; the bark is odourless and slightly astringent to taste. Anatomically, it shows well developed phellum; compactly arranged, tangentially elongated phellum cells; presence of stone cells in the phelloderm region; lignified stone cell patches, starch grains and acicular calcium oxalate crystals in the secondary phloem region.

The physicochemical standards like foreign organic matter, ash values, loss on drying and solvent extractive values are considered to be reliable for the crude drugs, are also determined for both the plants. Solvents used for

extraction were water, alcohol and water + alcohol (50:50) which were an addition to the pharmacopeial standard.

If the chemical profile of the plant is known, one can relate it, to its therapeutic activities. In the present study, qualitative phytochemical analysis of different extract *viz.* aqueous, alcoholic and hydroalcoholic of the plant were carried out. Tests for alkaloids, carbohydrates, glycosides, flavonoids and phenolic compounds were positive. The HPTLC fingerprinting for the extracts of stem bark of *O.Indicum* in alcohol, mixture of alcohol & water and water differ from another sufficiently to believe that different chemicals get extracted in different solvent system.

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