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Research Article

# PHARMACOGNOSTIC STUDY AND PHYTOCHEMICAL INVESTIGATION OF *OPERCULINA TURPETHUM(L.) SILVA MANSO.*

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**ABSTRACT**

Today sophisticated modern research tools for evaluation of the plant drugs are available but microscopic method is one of the simplest and cheapest methods to start with for establishing the correct identity of the source materials. Pharmacognostic investigation of the fresh, powdered and anatomical sections of the leaves,stems and roots of *operculina turpethum (L.) Silva Manso.* was carried out to determine its macroand microscopical characters and also some of its physical constants.Phytochemical studies of the powdered leaves revealed the presences of alkaloids, resins, glycosides, flavonides and some carbohydrates. The pharmacognostic profile of the leaves will assist in standardization for quality, purity and sample identification

**Keywords:** *Operculina turpethum*, Pharmacognostic Standardization, Root, Stem, Leaf

## INTRODUCTION

Since many centuries plants have been used throughout the world as drugs and remedies for treatment of various diseases as they have great potential for producing new drugs of great benefit to humankind. There are many approaches to search for new biologically active principles in higher plants. Natural flora has gained its attention in the treatment of common cold to dreadful diseases viz., AIDS, Cancer, etc, such plants are called as medicinal plants which have curative properties due to the presence of various complex chemical substances of different composition, viz., grouped as alkaloids, glycosides, corticosteroids, terpenoids, isoflavanoids, steroids etc. Plants based products have been in use for medicinal value or other purposes right from the dawn of civilization, the traditional remedies of the ancient world were all based on natural products.

*Operculina turpethum* is an perennial with milky juice; root long, slender, fleshy, much branched; stems very long, twining and much twisted together, angled and winged, pubescent, tough and brown when old.Leaves 5-10 by 1.3-7 cm., ovate or oblong, rarely slightly lobulate, subacute, mucronate, more or less pubescent on both sides especially when young, minutely reticulately veined, base cordate or truncate; petioles 2.5 cm. long; bracts large, lanceolate, pubescent reaching 2.5 cm. long, caduceus, ofeten pinkish; pedicels 0.6-2.5 cm. long, stout, pubscent, slightly thickened upwards. Outer sepals up to 2.2 cm. long in flower, much enlarged in fruit, broadly ovate or suborbicular, obtuse, mucronate, concave, pubescent; the 3 inner sepals smaller, scarcely 2 cm. long, very thinly membranous, glabrous, apiculate. Corolla white, 3.8-5cm. long, subcampanulate. Anthers nearly 8mm. long, narrowly oblong, cordate[1,2]. Flowering occurs mainly between August and October. And fruiting from November to December[3].This plant is widespred in old tropics from E. Africa to N. Australia, this plant common in Godavari in andhra pradesh.It is widely distributed in tropical Africa and Asia. In India it is found in damp and it occurs almost throughout India up to an altitude of About 1000 m; it is sometimes grown in gardens for its beautiful flowers[4]. It is rare on open sandy soils. And it is occasionally cultivated in India.It is found throughout India in open Distributed habitats and in woody thickets and hedges to an altitude 900-1000 m. occasionally grown in gardens as an ornamental plant[5].

## MATERIALS AND METHODS

### Plant material

Plant material was collected from local areas of Vijayawada, Andhra Pradesh, India. Its parts were botanically authenticated by Prof. S.V. Raju, Taxonomist, Department of Botany, Kakatiya University, Warangal, Andhra Pradesh, India. A voucher specimen (CV-028) was submitted in the Department of Pharmacognosy, Vaagdevi College of Pharmacy, Hanamkonda, Andhra Pradesh, India for future reference. All other reagents used were of analytical grade.

### Methods

Macroscopic characters of Leaves, stem and root observed and shown in Tables and Figures 1, 2 and 3.

**Table 1: Macroscopic characters of Leaves**

| | Characters |
|---|---|
| Leaf | Simple, alternate (Figure 1) |
| Shape | Ovate,oblong,ordate |
| Size | 5-15cm long;1.3-7cm broad |
| Texture | Scabrous |
| Apex | Acuminate |
| Colour | Green, Dull green |
| Taste | bitter |
| Margin | Sinuate and dentate |
| Surface | Both surfaces are smooth |
| Odour | chracteristics |
| Shape | Ovate, oblong, cordate |

**Fig. 1: Leaves of OT**

**Table 2: Macroscopic characters of Stem**

| | **Characters** |
|---|---|
| Stem | Cylindrical (Figure 2) |
| Shape | Angled |
| Size | 2 - 15 cm long;<br>3mm - 5 cm broad |
| Margin | Sinuate and dentate |
| Base | Cordate,trunicate |
| Surface | Longitudinal wrinkles |
| Colour | Dark brown colour |
| Venation | Similar |

**Fig. 2: Stem of OT**

**Table 3: Macroscopic characters of Root**

| | **Characters** |
|---|---|
| Root | Cylindrical,un branched (Figure 3) |
| Shape | Elongated, thin root lets |
| Size | 1- 5 cm diameter |
| Margin | Central wood portion |
| Base | Furrows |
| Surface | Dull greay |
| Colour | Reddish-gray to brown colour |
| Taste | Slightly acrid and nauseating |
| Odour | Indistinct |

**Fig. 3: Roots of OT**

**Physico chemical analysis**

Physico-chemical values such as the percentage of ash values and extractive performed according to official methods prescribed Indian Pharmacopoeia, (1996) and the WHO Guidelines Control Methods for Medicinal Plant Materials (WHO/QCMMPM guidelines, 1992).

**Determination extractive values**

Extractive valves are useful for evaluation of crude drugs and give an idea about the nature of chemical constituents present in them. Extracts obtained by exhausting crude drugs are indicative of approximate measures of certain chemical compounds they contain, the diversity in chemical nature and properties of contents of drug. Various solvents are used for determination of extractives. The solvent used for extraction is in a position to dissolve appreciable quantity of substance desired. About 5 gm of the air-dried drug, coarsely powdered was macerated with 100 ml of alcohol in a closed flask for 24 hours with occasional shaking during six hours and allowed to stand for 18 hrs. Filtered rapidly taking precaution against loss of alcohol, evaporated 25 ml of the filtrate to dryness in a tared flat-bottomed shallow dish, dried at 105°C, and weighed. The results were recorded in Table 4.

**Table 4: The percentage of alcohol-soluble extractive was calculated with reference to the air-dried drug[6, 7, 8]**

| Particulars | Leaf (w/w) | Stem(w/w) | Root(w/w) |
|---|---|---|---|
| Alcohol soluble extractive value | 2.2 | 1.98 | 2.1 |
| Water soluble extractive value | 2.89 | 2.7 | 2.86 |

**Table 5: Qualitative phytochemical screening[9]**

| Test | Leaf | | Stem | | Root | |
|---|---|---|---|---|---|---|
| | P.E+ ME | AQ | ME | AQ | ME | AQ |
| Steroids | + | + | + | + | + | + |
| Glycosides | + | + | + | + | + | + |
| Carbohydrates | + | + | + | + | + | + |
| Alkaloides | + | + | + | + | + | + |
| Tannins | - | - | - | - | - | - |
| Flavonides | + | + | + | + | + | + |
| Fixed oils | - | - | - | - | - | - |
| Saponons | + | + | + | + | + | + |
| Phenolic compounds | + | + | + | + | + | + |

Note: P.E- Petroleum Ethar, ME- Methanol, AQ- Aqueous.

**RESULTS AND DISCUSSION**

**Preliminary phytochemical analysis**

Aquous and Methanolic extract of O. turpethum showed the presence of glycosides, saponins flavanoids, steroids and carbohydrates and the results of the study entered in Table 5.

**Microscopic characters**

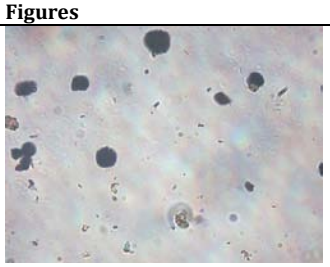
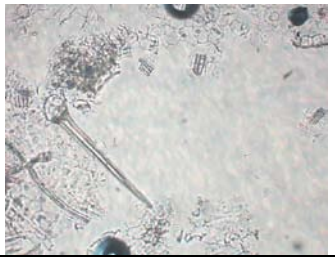
**Stem**

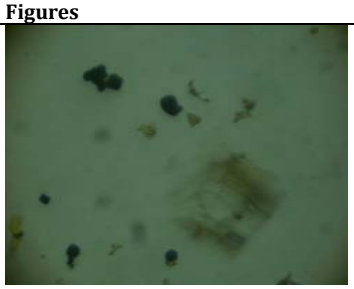
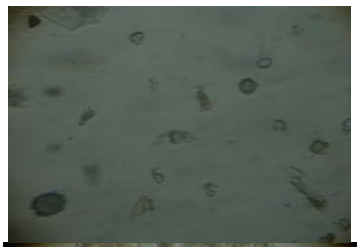
T.S. Of young stem, the epidermis consists of a single layer of tubular cells, the outer and radial walls of which are thickened[10]. A narrow parenchymatous cortex contains a few large cells containing resin which stains yellow to orange with Sudan III. Occasionally isolated or groups of thick walled pericyclic fibers are found out side the vascular tissue in a discontinuous ring. Next to the phloem, two to four layers of distinct cambium cells are present followed by xylem consisting of large vessels, single or in pairs measuring 64-100-138-177-270 µ in length and 94-157-199-434 µ in width. The vessels sometimes show tylosis and closely covered by bordered pits having slit-like openings. Spiral and reticulate vessels are also present. The tracheidal vessels have mostly oblique pits and measure 302-447-607 µ by 28-40-61µ. Tracheids 324-484-674 µ in length are straight or tortuous with oblique slit- like pits and occasionally forked ends. Fibro-tracheid's which measure 227-464-628-960 µ in length show fewer slit-like oblique pits while true fibers measure 50-72-93 µ in length. A septate fiber are 480-943-1800 µ long and tends to break at the septa. The medullary rays in the xylem which are uniserriate in young stems and more than three serriate in thicker specimens are made up of elongated, lignified and pitted cells. The xylem is followed by perimedullary phloem. In older stems cork is present and the phellogen gives rise to a narrow phelloderm. Resin cells are embedded in the parenchymatous cells of the cortex, phloem bands and pith. Calcium oxalate crystals in the form of clusters 13-21-31µ, rosettes 9-15-23 µ and a few prisms 9-13-17 µ are found in the cortex, phelloderm, phloem and pith.The simple starch grains (5-9-14 µ) which are oval, spherical and Muller shaped are found in all parenchymatous tissues[11, 12, 13].

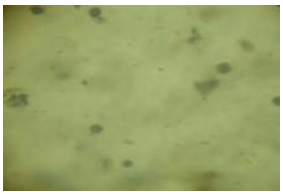
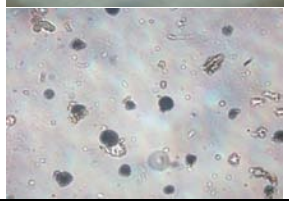
**Root**

Mature root shows thin cork, consisting of 3-5 rows of brown Cells, secondary cortex 4-6 layered, composed of tangential elongated, thin-walled cells; some of the cortical cells become thick-walled appearing as isolated, oval to sub rectangular sclerenchymatous cells having wide lumen; secretory cavities surrounded by subsidiary cells and resin canals found scattered in secondary cortex; secondary phloem, a wide zone, consisting of sieve elements and phloem parenchyma; vascular bundles arranged in a continuous and a discontinuous ring, traversed by uni and biseriate medullary rays; numerous resin cells also seen in phloem in longitudinal rows; xylem shows 3-5 radiating arms; small patches of intraxylary phloem often formed; xylem vessels in singles or 2-3 in groups, having simple pits on their walls; calcium oxalate crystals is as prisms and rosettes found scattered in cortex, phloem parenchyma, xylem parenchyma and medullary ray cells; starch grains, both simple and compound, simple oneselliptical to spherical with central cleft hilum, compound grains consisting of 2-4 components, size varys from 5-44µ in dia., foundscattered in cortex, phloem parenchyma, xylem parenchyma and medullary ray cells[14, 15].The powdered analysis of stem and root are carriedout and shown in Table 6.

**Table 6: Powder analysis[16]**

| Part | Chemical | Observation | Figures |
|---|---|---|---|
| **Leaf** | Iodine solution | Simple and blue starch grains. |  |
| | Phloroglucinol | Elongated unicellular trichomes. |  |

| Part | Chemical | Observation | Figures |
|---|---|---|---|
| **Stem** | Iodine solution | Simple and blue starch grains. |  |
| | Phloroglucinol | Phloem with calcium oxalate crystals and starch grains. |  |
| | Acetic acid | Prisms and cluster type of Ca-oxalate crystals. |  |

| Part | Chemical | Observation | Figures |
|---|---|---|---|
| **Root** | Iodine solution | Blue color simple starch grains. |  |
| | Acetic acid | Prisms type of Ca –oxalate crystals. |  |
| | Glycerin | Starch grains + Ca – oxalate crystals + oil globules. |  |

**CONCLUSION**

In conclusion, pharmacognosic parameters could be useful to detect the authenticity of this medicinally useful plant. Furthermore, the aquous and Methanolic extract of *O. turpethum* showed the presence of glycosides, saponins flavanoids, steroids and carbohydrates. The stem methanolic extract has anti oxidant activity and significant anti-hyperglycemic activity. Further investigations are needed to identify the lead molecule and to elucidate exact mechanism of action for antioxidant and antidiabetic effect.

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