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## Comparative analytical study of physicochemical parameters of different plant parts of *Operculina Turpethum L*

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### Abstract

*Operculina turpethum L.* is a perennial medicinal plant of the family Convolvulaceae. Since ages, the plant has been used for the treatment of various diseases. The present study was an attempt to analyses physicochemical parameters of different plant parts of *Operculina turpethum L.* according to the standard procedures. Use of the plant for treating various types of diseases is mentioned in Ayurvedic treatise like *Charaka Samhita*. But there were no sufficient reports regarding all plant parts of the plant. So the current comparative study was designed and conducted to evaluate the physicochemical evaluation of leaf, stem, root, flower and fruit of *Operculina turpethum L.* The current study revealed to the bio-prospecting of different plant parts of leaf, stem, root, flower and fru it of *Operculina turpethum L.* for various medicinal principles as well as properties.

**Keywords:** *Operculina Turpethum L.*, physicochemical parameters

### Introduction

Plants are the main source of substance and medications to the human kind since ages. The medical tradition of India is perhaps the most ancient spanning form the prehistoric times. Just as there is continuity of life, there is continuity of medical science. It is natural to look upon the *Vedic* literature as a channel through which this continuous medical tradition reached down to the earliest systemetisers. *Vedic Samhitas* contain abundant references, relating to both diseases and drugs of plant origin.

Plants above all other agents have been used for medicine from time immemorial because they have fitted the immediate personal need are easily accessible and inexpensive. *Indian Materia Medica* includes 2000 natural products of therapeutic importance of which 400 are of mineral and animal origin and rest are of vegetable origin. There are approximately 1250 Indian medicinal plants, which are used in formulating therapeutic preparation according to Ayurveda and other traditional system of medicine (Mills *et al*, 2000) <sup>[8]</sup>.

Given the vast range of chemical structure provide by natural sources, screening of libraries of natural products seems to be good. There are estimated to be at least 250,000 species of higher plants and around 30 million species in total; most of these have not been tested for biological activity. *Operculina turpethum L.* is among the most important purgatives in the *Indian material medica*. It has been known in ayurveda as “*Virechan*” or a laxative.

### Material & Methods

For the correct interpretation, it is essential that plant material’s sampling is done at the prescribed morphological stage of growth and the correct plant parts. Fresh plant tissues should be used for analysis and the material should be free from contaminations. Different plant parts of *Operculina Turpethum L.* were collected from nursery stock maintained at in house garden at own residential plot. Plant parts were manually cleaned and shed dried under natural condition for further analysis.

Different plant parts of *Operculina Turpethum L.* were evaluated through the well established procedures (*Ayurvedic Pharmacopoeia of India*, Part 1, Vol. 7 & 8) of physicochemical analysis like Foreign matter, Total ash, Acid insoluble ash, Water soluble ash, Sulphated ash, Alcohol soluble extractive, Water soluble extractive, Ether soluble extractive (fixed oil content), Moisture content, Water Insoluble Matter, Volatile Oil, Total Soluble Solids, Solubility in Water.

### Determination of Foreign Matter

The sample shall be free from visible signs of mold growth, sliminess, stones, rodent excreta, insects or any other noxious foreign matter when examined as given below.

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Take a representative portion from a large container, or remove the entire contents of the packing if 100 g or less, and spread in a thin layer in a suitable dish or tray. Examine in daylight with unaided eye. Transfer suspected particles, if any, to a petri dish, and examine with 10x lens in daylight.

#### Determination of Total Ash

Incinerate about 2 to 3 g accurately weighed, of the ground drug in a tared platinum or silica dish at a temperature not exceeding 600° until free from carbon, cool in desiccator for 30 min and weigh without delay. If a carbon free ash cannot be obtained in this way, exhaust the charred mass with hot water, collect the residue on an ashless filter paper, incinerate the residue and filter paper, add the filtrate, evaporate to dryness, and ignite at a temperature not exceeding 600°. Calculate the percentage of ash with reference to the air-dried drug.

#### Determination of Acid Insoluble Ash

To the crucible containing total ash, add 25 ml of *dilute hydrochloric acid*. Collect the insoluble matter on an ashless filter paper (Whatman 41) and wash with *hot water* until the filtrate is neutral. Transfer the filter paper containing the insoluble matter to the original crucible, dry on a hot-plate and ignite to constant weight. Allow the residue to cool in a suitable desiccator for 30 min and weigh without delay. Calculate the content of acid insoluble ash with reference to the air-dried drug.

#### Determination of Sulphated Ash

Heat a silica or platinum crucible to redness for 10 minutes, allow to cool in a desiccator and weigh. Put 1 to 2 g of the substance, accurately weighed, into the crucible, ignite gently at first, until the substance is thoroughly charred. Cool, moisten the residue with 1 ml of *sulphuric acid*, heat gently until white fumes are no longer evolved and ignite at 800° ± 250 until all black particles have disappeared. Conduct the ignition in a place protected from air currents. Allow the crucible to cool, add a few drops of *sulphuric acid* and heat. Ignite as before, allow to cool and weigh. Repeat the operation until two successive weighing do not differ by more than 0.5 mg.

#### Alcohol Soluble Extractive

Macerate 5 g of the air dried drug, coarsely powdered, with 100 ml of alcohol the specified strength in a closed flask for twenty-four hours, shaking frequently during six hours and allow to stand for eighteen hours. Filter rapidly, taking precautions against loss of solvent, evaporate 25 ml of the filtrate to dryness in a tared flat bottomed shallow dish, and dry at 105°, to constant weight and weigh. Calculate the percentage of alcohol-soluble extractive with reference to the air-dried drug.

#### Water Soluble Extractive

Proceed as directed for the determination of alcohol-soluble extractive, using *chloroform water* instead of ethanol.

#### Ether Soluble Extractive (Fixed Oil Content)

Transfer a suitably weighed quantity (depending on the fixed oil content) of the air-dried, crushed drug to an extraction thimble, extract with *solvent ether* (or *petroleum ether*, b.p. 400 to 600) in a continuous extraction apparatus (Soxhlet

extractor) for 6 hours. Filter the extract quantitatively into a tared evaporating dish and evaporate off the solvent on a water bath. Dry the residue at 105° to constant weight. Calculate the percentage of ether-soluble extractive with reference to the air-dried drug.

#### Moisture Content

Dry the evaporating dish for 30 min under the same conditions to be employed in the determination. Place about 5 to 10 gm of powder accurately weighed in a tared evaporating dish. Place the loaded bottle in the drying chamber. Dry the test specimen at 105 °C for 3 hours, and weigh. Continue the drying and weighing at half an hour interval until difference between two successive weighing corresponds to not more than 0.25 per cent.

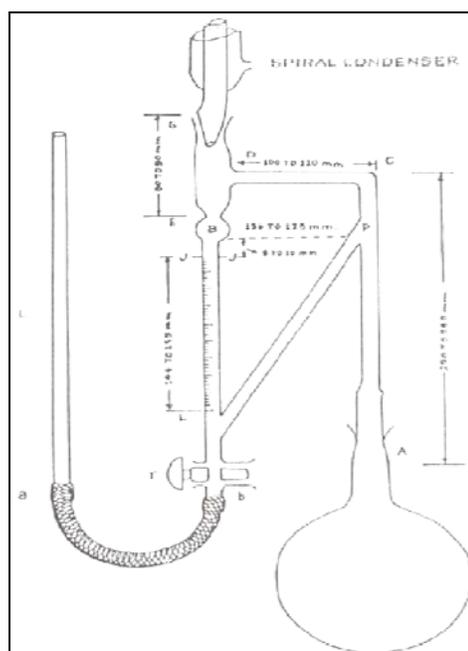
#### Water Insoluble Matter

Take 10 gm of sample, add 200 ml hot distilled H<sub>2</sub>O and bring to boiling. Allow to cool to room temperature. Filter through a tared gooch crucible having a bed of asbestos or sintered glass filter. Wash the residue with hot water till the filtrate is sugar-free (perform Molisch test). Dry the gooch crucible or sintered glass filter at 110 ± 2 °C and weigh. Express as % insoluble matter. Volatile Oil

The determination of volatile oil in a drug is made by distilling the drug with a mixture of *water* and *glycerin*, collecting the distillate in a graduated tube in which the aqueous portion of the distillate is automatically separated and returned to the distilling flask, and measuring the volume of the oil. The content of the volatile oil is expressed as a percentage v/w.

The apparatus consists of the following parts. The clewenger's apparatus described below is recommended but any similar apparatus may be used provided that it permits complete distillation of the volatile oil. All glass parts of the apparatus should be made of good quality resistance glass.

The apparatus is cleaned before each distillation by washing successively with *acetone* and *water*, then inverting it, filling it with *chromic sulphuric acid* mixture, after closing the open end at G, and allowing to stand, and finally rinsing with water.



A suitable quantity of the coarsely powdered drug together with 75 ml of *glycerin* and 175 ml of *water* in the one litter distilling flask, and a few pieces of porous earthen ware and one filter paper 15 cm cut into small strips, 7 to 12 mm wide, are also put in the distilling flask, which is then connected to the still head. Before attaching the condenser, water is run into the graduated receiver, keeping the tap T open until the water overflows, at P. Any air bubbles in the rubber tubing a-b are carefully removed by pressing the tube. The tap is then closed and the condenser attached. The contents of the flask are now heated and stirred by frequent agitation until ebullition commences. The distillation is continued at a rate, which keeps the lower end of the condenser cool. The flask is rotated occasionally to wash down any material that adheres to its sides. At the end of the specified time (3 to 4 hours) heating is discontinued, the apparatus is allowed to cool for 10 minutes and the tap T is opened and the tube L1 lowered slowly; as soon as the layer of the oil completely enters into the graduated part of the receiver the tap is closed and the volume is read. The tube L1 is then raised till the level of water in it is above the level of B, when the tap T is slowly opened to return the oil to the bulb. The distillation is again continued for another hour and the volume of oil is again read, after cooling the apparatus as before. If necessary, the distillation is again continued until successive readings of the volatile oil do not differ. The measured yield of volatile oil is taken to be the content of volatile oil in the drug. The dimensions of the apparatus may be suitably modified in case of necessity.

### Total Soluble Solids

#### Method 1 (Total Soluble Solids in Hydro-Alcoholic)

- Take about 1 gm, accurately weighed, of the substance being examined in a 100 ml volumetric flask, dissolve in 50 ml of 50% v/v aqueous ethanol, sonicate for 10 min., heat on water bath (avoiding evaporation), cool and dilute to 100 ml with 50% v/v aqueous ethanol. Mix and quickly pipette out 25 ml solution to a tared glass dish and evaporate.
- Centrifuge the remaining liquid for 10 min at 3000 rpm. Pipette out 25 ml of the supernatant obtained after centrifugation to a tared glass dish and evaporate.
- After evaporation of solvent, place the glass dishes in oven at 105° to dry to a constant wt. The wt of residue obtained after centrifugation is not less than 90% of the wt of the residue obtained before centrifugation.

#### Method 2 (Total Soluble Solids in Water)

- Take about 1 gm, accurately weighed, of the substance being examined in a 100 ml volumetric flask, dissolve in 50 ml of water, sonicate for 10 min., heat on water bath (avoiding evaporation), cool and dilute to 100 ml with water. Mix and quickly pipette out 25 ml solution to a tared glass dish and evaporate.
- Centrifuge the remaining liquid for 10 min at 3000 rpm. Pipette out 25 ml of the supernatant obtained after centrifugation to a tared glass dish and evaporate.
- After evaporation of solvent, place the glass dishes in oven at 105° to dry to a constant wt. The wt of residue obtained after centrifugation is not less than 90% of the wt of the residue obtained before centrifugation.

#### Solubility in Water

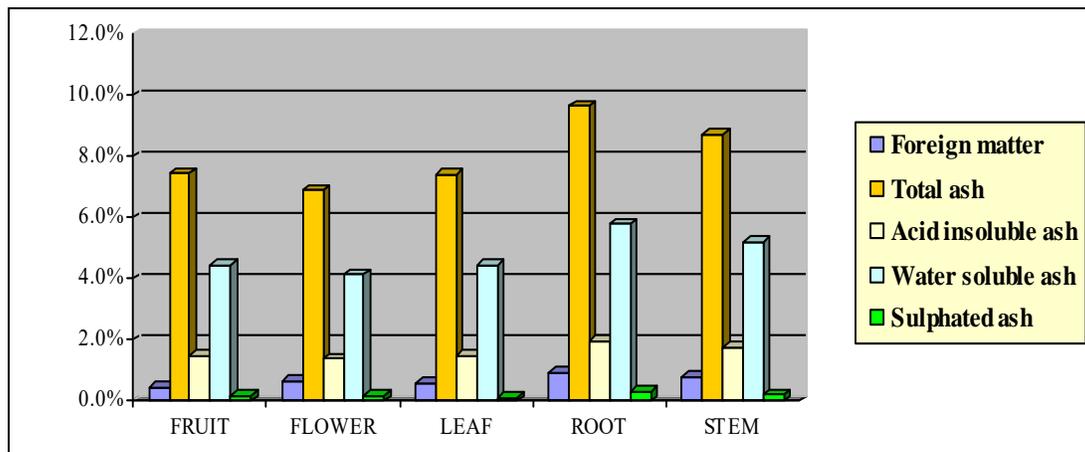
Take 100 ml of distil water in a *Nessler cylinder* and add air-dried and coarsely powdered drug up to saturation. Then stir the sample continuously by twirling the spatula (rounded end of a micro spatula) rapidly. After 1 minute, filter the solution using Hirsch funnel, evaporate the filtrate to dryness in a tared flat bottomed shallow dish and dry at 105° to constant weight and calculate the solubility of the drug in water (wt. in mg/100ml).

#### Results and Discussion

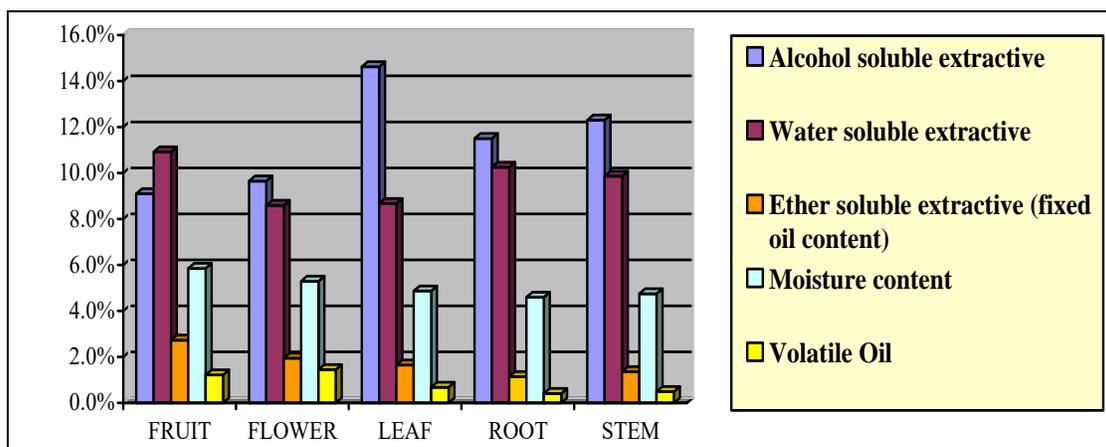
*Operculina Turpethum* L. is well widely used medicinal plant since ancient time and all most all the plant parts are used as natural remedies. Result of physicochemical analysis was summarized in Table 1, Graph 1, Graph 2 and Graph 3. Foreign matter was found less and as per guideline by *Ayurvedic Pharmacopoeia of India* in all plant parts of *Operculina Turpethum* L. Total ash, Acid insoluble ash, Water soluble ash and Sulphated ash were found higher in root than leaf, flower, fruit and stem. Ether soluble extractive (fixed oil content), Moisture content, Total Solids in water and Solubility in Water value were comparatively higher in fruit than leaf, flower, fruit and stem. Water Insoluble Matter and volatile oil content value obtained higher in flower than leaf, flower, fruit and stem. Alcoholic extractive value was notified higher in leaf and Water soluble extractive was notified in fruit than other plant parts of *Operculina Turpethum* L. A total soluble solid in hydro-alcoholic value was observed higher in root than leaf, flower, fruit and stem of *Operculina Turpethum* L.

**Table 1:** Analysis of Physicochemical parameters of different plant parts of *Operculina Turpethum* L.

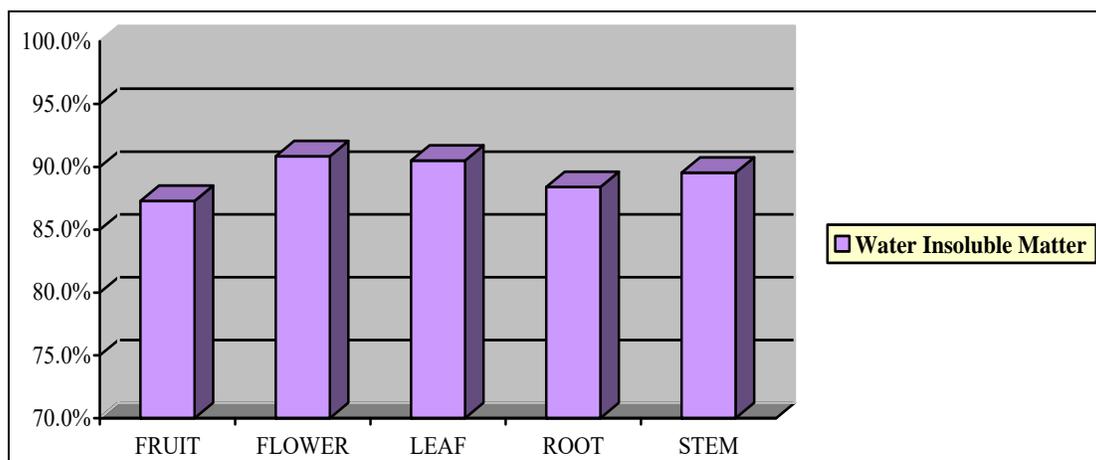
Physicochemical Parameters	Plant Parts				
	Fruit	Flower	Leaf	Root	Stem
Foreign matter	0.43%	0.65%	0.60%	0.95%	0.80%
Total ash	7.45%	6.90%	7.40%	9.65%	8.70%
Acid insoluble ash	1.49%	1.38%	1.48%	1.95%	1.74%
Water soluble ash	4.47%	4.14%	4.45%	5.79%	5.22%
Sulphated ash	0.16%	0.19%	0.12%	0.32%	0.21%
Alcohol soluble extractive	9.10%	9.65%	14.62%	11.50%	12.30%
Water soluble extractive	10.92%	8.59%	8.67%	10.25%	9.86%
Ether soluble extractive (fixed oil content)	2.73%	1.95%	1.65%	1.14%	1.36%
Moisture content	5.85%	5.29%	4.87%	4.60%	4.75%
Water Insoluble Matter	87.29%	90.85%	90.50%	88.40%	89.54%
Volatile Oil	1.22%	1.45%	0.68%	0.41%	0.49%
Total soluble Solids in water	11.75%	9.25%	9.17%	10.90%	10.16%
Total soluble Solids in hydro- alcoholic	12.48%	13.13%	13.26%	14.95%	13.46%
Solubility in Water	12.71%	9.15%	9.50%	11.60%	10.46%



**Fig 1:** Analysis of Physicochemical parameters of different plant parts of *Operculina Turpethum L.*



**Fig 2:** Analysis of Physicochemical parameters of different plant parts of *Operculina Turpethum L.*



**Fig 3:** Analysis of Physicochemical parameters of different plant parts of *Turpethum L.*

For the pharmacological as well as pathological discovery of novel drugs, the essential information regarding the chemical constituents is generally provided by the phytochemical screening of plant extracts. In the present study, quantitative tests for all plant parts showed significant indication about the presence of bioactive compounds. This finding of phytochemicals is good enough to reflect their importance. There is a need for documentation of research work carried out on traditional medicines (Dahanukar, 2000) [6] and also it

becomes extremely important to make an effort towards standardization of the plant material to be used as medicine. The process of standardization can be achieved by stepwise physicochemical studies. These studies help in quality assurance of the starting materials is an essential prerequisite to ensure reproducible quality of herbal medicine which will contribute to its safety and efficacy. The present study uses simple tools such as physicochemical analysis of *Operculina Turpethum L.*, an important traditional medicine.

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