



**REVIEW ARTICLE**

**A Review on Phytopharmacological Activities of *Operculina Turpethum***

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**ABSTRACT**

Secondary metabolites from natural sources play a crucial role in the treatment of various ailments. Traditionally *Operculina turpethum* has been used to treat gastrointestinal disturbances and asthma. Therapeutically the plant has activity against tumor, tuberculosis, malaria etc. In the present review aim is to search literatures for the phytochemical analysis and pharmacological activities of *Operculina turpethum* stem and roots. The compiled data may be helpful for the researchers to focus on the priority areas of research yet to be discovered. Complete information about the book has been collected from various books, journals and Ayurvedic texts of the last 10 years. Pharmacological and phytochemical particulars of the plant were extracted from various published reports focusing on the safety profile of the plant. This review concludes various phytoconstituents isolated so far and the various pharmacological activities reported from the roots and stem of *Operculina turpethum*.

**KEYWORDS**

*Operculina Turpethum*, Convolvulaceae, Pharmacology, Phytochemical Analysis

**INTRODUCTION**

Complimentary of alternative medicine is rapidly increasing worldwide to meet the market demands for herbs that is lightly to remain high due the bioactive constituents present in it and yet cannot be prepared synthetically<sup>1</sup>. Medicinal plants play a vital role in all most all the traditional system of medicine and folklore practices. In concordance India has rich bio diversity with flourished heritage of tradition medicines. One such example constitutes Artemisinin an active anti-malarial compound isolated from *Artemisia annua* of Chinese medicine. Conventional as well as western medicine comprises mostly medicinal components that are derived from plants. In the present scenario around 88% of the global population focuses on plant derived medicines as

first line defense in combating dreadful disease of today. Traditional medicine have not however been incorporated in most national health systems and the potential of service provided by the traditional medical practitioner is not fully utilized. *Operculina turpethum* Linn. Belonging to family convolvulaceae is widely distributed throughout India China Sri Lanka and Australia. The plant is commonly known as Trivrit and exists in 2 varieties namely Aruna or Shweta (*Operculina Turpethum*) and Shyama (*Ipomea Petaloides*)<sup>2</sup>. Root of Trivrit is used on a large scale in disorders like skin peptic acid disorders and constipation. In Ayurveda this has been included among the 10 purgative herbs (i.e. *Bhedaniya Mahakashaya*), group of 'ten antidote herbs' (i.e. *Vishaghna Mahakashaya*), group of 'ten herbs supportive for therapeutic enema' (i.e. *Ashthapanopag Mahakashaya*), group of colon cleanser, antitumor & antidote herbs. (i.e. *Shyamadi Gana*), and in the group of 'herbs eliminating the toxins (i.e. vitiated Doshas) from

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lower half of the body' (i.e. *Adhobhagahar Gana*)<sup>3</sup>. Basically the bark of this plant is used as a purgative whereas the leaves are used as cardiotoxic. Probably the roots bark and seeds contain cardiac glycosides such as neriodorin neriodorein and karabin. The fresh juice of leaves finds use in ophthalmia as inducer of lacrimation<sup>4</sup>.

### Plant Profile

*Operculina turpethum* is a perennial climber with long fleshy roots and long twisting pubescent stems that turns very tough and brown when old<sup>5</sup>.



Figure 1: *Operculina turpethum*

### Taxonomical Classification

Kingdom : Plantae  
Subkingdom : Tracheobionata, vascular plants  
Super division : Spermatophyta, seed plants  
Division : Angiosperma  
Class : Dicotyledons  
Order : Solanales  
Family : Convolvulaceae  
Genus : *Operculina*  
Species : *O. turpethum* (L.) Silva Manso  
Binomial name: *Operculina turpethum* (L.) Silva Manso<sup>6</sup>

### Common Names

Latin : *Ipomoea turpethum* (L.)  
R. Br., *Convolvulus turpethum*

English: Turpeth, Indian Jalap

Ayurvedic: Trivrtaa, Trivrtta, Triputaa, Tribhandi, Saralaa, Suvahaa, Rechani, Nishotra, Kaalaa, Kumbha, Shyaama, Shyaamaa

Siddha/Tamil: Karunchivadai<sup>6</sup>

Unani: Turbud, Nishoth

### Traditional Uses

Traditionally root bark of *Operculina turpethum* administered as a powder along with vehicles like fermented rice water milk cereal water triphala black pepper sugarcane juice cow and goats urine. As a therapeutic purgative agent in GI and skin disorder ascites and various cancers. About 135 herbal and herbomineral formulations used in ayurvedic medicine comprise of *Operculina turpethum* as an important ingredient<sup>3</sup>. Some of them are *Trivrit Avaleha*, *Panchasama Churna* *Alambushadi Yoga Malashodhak Churn*, *Avipattikar Churna*, *Abhayadi Modak*, *Agnimukh loha*, *Kalyanak Gud*, *Vyoshadi Gutika*, *Narach Churna*, *Sukhavirechak Churna*, *Tryushanadi Churna* etc<sup>7</sup>.

### Geographical Description

*Operculina turpethum* is native to Asia, Africa & Australia while is naturalized in West Indies. The plant is grown throughout India up to 1000 m; and is occasionally grown in gardens.<sup>8</sup>

### Ayurvedic Preparations & Formulations

Trivrit Avaleha – GI disorders

Panchasama Churna – Constipation, Dysentery

Abhaya Modak – Constipation, Therapeutic purgative

Kalyanak Gud – GI disorders, tumors

Jambvadi Taila– Gonorrhoea

Trivrit Arishta– Abdominal tumor<sup>9</sup>

### Phytochemical Features

An analogue of Jalapine and convolvulin, turpethin is present in almost 10% of the total phytoconstituents present in *Operculina turpethum*. An acidic moiety is also been reported to be present in a large quantity in

*Operculina turpethum* in almost 5 forms i.e Turpethinic acids-A,B,C,D& E<sup>3</sup>. The purgative action of *Operculina turpethum* is mainly due to turpethin and can be considered as a relatively safer substitute for jalap<sup>6</sup>.

### **Phytochemical Studies**

Veena Sharma *et. al* reveals the presence of a steroidal glycoside, Stigma -5,22dien-3-o-b-D-glucopyranoside from the root bark of *Operculina turpethum* and explained its chemistry with spectral analysis. The steroidal glycoside was isolated from the ethanolic root extracts<sup>10</sup>.

Rashid *et. al* explained the presence of an acrylamide i.e .3-(4-hydroxy-phenyl)-N-[2-(4-hydroxy phenyl)-ethyl]-acrylamide derived from the ethyl acetate fraction of the *Ipomoea turpethum* stem extracts and was confirmed by extensive spectral analysis<sup>11</sup>.

### **Pharmacological Studies**

#### **Toxicity Studies**

Singh *et. al.* in 2014 found the acute oral toxicity using the methanolic extract of *Operculina turpethum* in mice and the LD<sub>50</sub> value was found to be 1917.66 mg/kg<sup>12</sup>.

#### **Nephroprotective Activity**

Veena Sharma *et. al* explained the therapeutic anti-nephrotoxic efficacy of the isolated a steroidal glycoside, Stigma -5,22dien-3-o-b-D-glucopyranoside from the root bark of *Operculina turpethum* in NDMA induced renal carcinogenesis in male mice and hepatopathy in the liver of mice. The ethanolic extract of the roots and also the isolated compound were administered in mice and it showed significant recovery at 400 mg/kg and 50 mg/kg for the extract and the isolated compound respectively<sup>12</sup>.

#### **Hepatoprotective Activity**

Sureh kumar *et. al.* evaluated the hepatoprotective potential of *Operculina turpethum* by inducing paracetamol in rats. The ethanolic extract of *Operculina turpethum* administered intraperitoneally 100-2000 mg/kg body weight showed significant hepatoprotective

activity in a dose dependent manner. Silymarin was used as a standard drug and showed significant increase in hepatoprotective activity<sup>13</sup>.

#### **Cytotoxic Activity**

Protective effects of *Operculina turpethum* stem extracts in DMBA induced breast cancer in rat models was studied by Anbuselvam *et. al.* in 2007. The ethanolic stem bark extracts was administered orally at 100mg/kg to study their anti-oxidant property and further DMBA as an inducer was used in 20 mg for a period of 45 days. The results showed remarkable reduced lipid peroxidation and increased anti-oxidant levels with a decrease in tumor weight<sup>14</sup>.

#### **Anti-Microbial Property**

The anti –microbial potency of the petroleum ether and ethanolic extracts of *Operculina turpethum* were studied for their anti-microbial potency. The activity was tested by disc-diffusion method against *Bacillus subtilis*, *Streptococcus haemolytica* and gram negative bacteria *Pseudomonas aeruginosa*, *Shigella sonnei* and *Shigella dysenteriae*. The extracts were tested in several human pathogenic bacteria and the minimum inhibitory concentration (MIC) was reported in arrange from 0.13-0.75 mg/ml by Jahangir Alam *et. al*<sup>15</sup>.

#### **Anti-Ulcer Activity**

Vidya Ignatius *et. al.* evaluated the methanolic and hydro alcoholic stem extracts of *Operculina turpethum* for their anti-ulcerative properties against ranitidine as standards.at a dose of 100mg/kg of body weight in aspirin + pyloric ligation induced ulcer models of male Albino rats. The hydro-alcoholic stem extracts shown better results when compared to the methanolic extract<sup>16</sup>.

#### **Anti-Diarrhoeal Activity**

Huma Shareef *et.al* explained the anti diarrhoeal effects of *Oerculina turpethum* ethanolic root extract through castor oil-induced diarrhea model in mice. A dose of 10mg/kg of loperamide was used as a standard. The root extracts showed promising results in a dose dependent manner

when administered orally in three different doses<sup>17</sup>.

### Anti-Arthritic activity

The anti-arthritic potential of the root extracts of *Operculina turpethum* was evaluated by the in-vitro models of inhibition of protein denaturation. The ethanolic root extracts in various concentration with BSA was tested for the activity. Acetyl Salicylic acid was used as a standard with an inhibition of 70% whereas it was 67.22% in case of the ethanolic extract<sup>18</sup>.

### Analgesic Activity

It evaluated using tail flick method and acetic acid induced writhing response. The chloroform extract showed better dose dependent response in comparison to the petroleum ether extract when administered orally. Diclofenac sodium was used as standard analgesic drug<sup>19</sup>.

### Anti-Diabetic Activity

Sankariah Pulipaka et. al. in his comparative study of the methanolic extracts of *Operculina turpethum* stem and roots described the effect of the plant in streptozotocin induced diabetes in experimental rat models at 100mg/kg of body weight. The values were compared with glibenclamide which was used as a standard. A significant reduction in the fasting glucose level was seen at the end of 21days<sup>20</sup>.

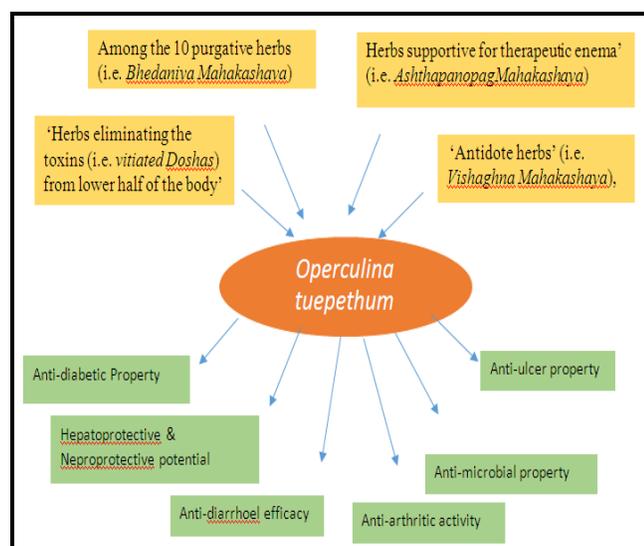


Figure 2: Plant uses

## CONCLUSION

The above review reveals that the plant has potent pharmacological activities. The plant was found to have promising nephroprotective, hepatoprotective, cytotoxic, anti-microbial, anti-ulcer, anti-diarrhoeal and anti-diabetic activity. The plant is traditionally claimed to possess purgative activity. The pharmacological actions of the plant may be due to the present of turpethin, turpethinic acid A-E in large amount. The presence of the resin glycoside and acrylamide may open new routes for exploring varies potential of the plant. More research is needed to isolate the various phytoconstituents present to get a clear idea of the mechanism of action of the plant. Literature review observed that there is no clinical trials have been done so far. The current literature review conclude that the plant *Operculina Turpethum* having high medicinal value and safe for medicinal uses.

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