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## PHYTOCHEMICAL AND PHARMACOLOGICAL REVIEW OF *Oldenlandia Corymbosa*

Sonja Jose\*, Jayakar B<sup>1</sup>, Kumar M<sup>2</sup>, Kothai R<sup>3</sup>

\*Research Scholar, Department of Pharmaceutical Analysis, <sup>2</sup>Registrar, Vinayaka Mission's Research Foundation, <sup>3</sup>Professor and Head, Department of Pharmaceutical Chemistry, <sup>4</sup>Professor and Head, Department of Pharmacology, Vinayaka Mission's College of Pharmacy, Vinayaka missions Research Foundation (Deemed to be University), Kondappaickenpatty, Salem-636008, Tamilnadu, India,

### ABSTRACT

India is a country with a huge resources of medicinal herbs. But most of these plants are used in traditional medicine in the period of human history before there were written records. we could have a large number of natural remedies for digits of illnesses. *Oldenlandia Corymbosa* or diamond flower in the family Rubiaceae 240 species are distributed throughout the tropical regions of india. it is widely used in Chinese traditional practices. The phyto-constituents present in *Oldenlandia Corymbosa* species were identified in order to relate the presence of biological and pharmacological activities. The plant showed the presence of flavonoids, phytosterols, phenolic compounds, fixed oils, tannins, alkaloids, iridoids and carbohydrates. Important pharmacological activities such as hepatoprotective, cytotoxic, anti-inflammatory, anti-tumors, antioxidant, antibacterial, anti-viral, cytotoxic and abortifacient properties were shown by researchers. The plant is used to cure skin infections, ulcers, cold, cough, bronchitis, female disorders and in various inflammations. This study will be support for further inquiries of the phytochemical and pharmacological activity on various parts *Oldenlandia Corymbosa*.

**KEY WORDS:** Ayurvedic, *Oldenlandia Corymbosa* Hepatoprotective, Anti-oxidant, Flavanoids, Pharmacological activity.

### INTRODUCTION

*Oldenlandia Corymbosa* known as 'parppatakapullu' in traditional medicine of Kerala. It has been shown to possess a range of folk and proven biological activities such as heptoprotective, oxytoxic, antimalarial, anti-diabetic and hepatoprotective. *Oldenlandia* belongs to Rubiaceae and the second largest genus of this family. It comprises of approximately 300 species in tropical Asia [1].

*Oldenlandia Corymbosa* commonly known as flat-top mille grains or diamond flower is a species of plant in the family Rubiaceae [2]. Diamond Flower is an annual herb with ascending or erect stems which are 4-angled. Linear-oblong or narrowly elliptic, almost stalkless leaves are 1-3.5 cm long and 1.5-7 mm wide, rough on margins. Midrib of the leaf is prominently visible. Flowers are borne in 2-8 flowered cymes in leaf axils. Flowers are white or

faintly pinkish-purplish, on slender stalks 4-8 mm long. Flower tube is about 2 mm long, with 4 petals. Stamens are inserted just above the base of the tube. Capsule is about 2 x 2 mm, flattened at apex, slightly laterally compressed. Diamond Flower is found in all over the tropical world. It is also found in the Himalayas [3].



**Taxonomical Classification [4]**

Kingdom: Plantae  
 Phylum: Spermatophyta  
 Class: Dicotyledonae  
 Order: Gentianales  
 Family: Rubiaceae  
 Genus: Oldenlandia  
 Species: *o. corymbosa*

**Traditional Uses**

- The plant is a major ingredient in mixtures used to treat fever [5], jaundice and as a tonic [6].
- This medication is well recommended by 'Sahasrayogam' for relieving pain specifically low back pain [7], lumbar spondylitis and sciatic [8]
- The plant also used to produce natural dyes [9].
- The roots found to be vermifuge properties [10].
- The plant is used to treat skin sores, ulcers, sore throat, bronchitis, gynecological infections and pelvic inflammatory diseases [11].

The plant has received greater attention recently due to the presence of a wide range of secondary metabolites and various pharmacological activities [12]. Hence, the present study was started to scrutinize the phytochemical constituents and pharmacological activity of *Oldenlandia corymbosa* [13].

**Chemical Constituents**

Various parts of the plant *O ldenlandia corymbosa* contains the following chemical constituents there are [14]

- Flavonols
- Phenolic acids,
- Anthocyanidins,
- Iridoids
- Terpenoids,
- Flavonoids,
- Steroids,
- Tannins
- Gums

**Senthamil Selvan et al.** The ethanolic extracts of plant contain many bioactive chemical constituents including alkaloids, glycosides, terpenoids, steroids, flavonoids, and tannins. The major source of antioxidant capacity of *Oldenlandia corymbosa* is both ascorbic acid and phenolic compounds [15]. The protection in the body provided against oxidative damage by fruit and vegetables has been attributed to the fact that these foods may provide an optimal mix of phytochemical, such as natural antioxidants and other bioactive compounds. Therefore, the supplementation of these natural antioxidants through a balanced diet containing adequate herbs could be much more effective than the supplementation of an individual antioxidant.

The plant posses appreciable amount of magnesium (6.79%), calcium (5.69%), potassium (4.89%),Ash(3.64%),Carbon (2.87%),Nitrogen (1.6%), Phosphorus(0.68%), Sodium(0.42%), Sulphur(0.22%), Iron(42.19ppm) and Molybdenum (0.09ppm) which help to carryout various biochemical reaction inside the human system. The plant consist of secondary metabolites such as total Alkaloids (0.42 mg/Kg)Total Flavonoids (0.62mg/Kg),Serpentines (0.06 mg/kg)Terpenoids (0.05 mg/Kg) and Quercetins (0.03 mg/Kg) which posses various biochemical activity such as anticancer anti inflammatory and antioxidant activity.

**Pharmacological Properties**

Recent pharmacological studies support the traditional medicinal uses and several biological activities of have been reported. The major findings are given below.

**Tanvi Patel et al.**, was reported the biochemical rationale by which *oldenlandia corymbosa* (L.) (Rubiaceae) is a weedy annual herb, found throughout India. It is commonly known as Parppatakapullu" in traditional medicine of Kerala. The plant is known to clear heat and toxins, activate blood circulation, promote diuresis and relieve stranguria. It is also active against appendicitis, hepatitis, pneumonia, cholecystitis, urinary infection, cellulites and snake bite. Chinese folk medicine describes the plant to treat skin sores, ulcers, sore throat, bronchitis, gynecologic infections and pelvic inflammatory diseases. The plant contains flavonols, phenolic acids, anthocyanidins, irridoids and alkaloids. A scrutiny of literature revealed some notable pharmacological activities of the plant such as hepatoprotective, cytotoxic anti-oxidant, oxytotic and anti malarial activity [16]. The present review is an attempt to highlight the various ethnobotanical and traditional uses as well as phytochemical and pharmacological reports on *Oldenlandia corymbosa*.

**Antioxidant Potential**

Antioxidant potential of the high- ethanolic plant extract has been evaluated by **Rupjyoti Bharaliet al.**, using in vitro radical scavenging. The result from in vitro experiments revealed the significantly(p,0.05) high antioxidant activity in hydro-ethanolic extracts when compared with a standard antioxidant ,ascorbic acid *O.corymbosa* contains some important groups of phytochemicals having exogenous antioxidant properties [17].

**Anthelmintic activity:**

**Abinash Kumar Sahu et al.**, was evaluated the Anthelmintic activity of Petroleum ether and Aqueous extract extracts were found to 10.92% w/w and 5.45% w/w. The preliminary phytochemical screening showed the presence of alkaloids, carbohydrate, saponins, Proteins & amino acid, Phenolic & flavonoids compounds and shows the absence of Phytosterol. Inluorescence analysis the powder drug was treated with different reagent which

showed different colours in U.V light [18]. The data revealed that the aqueous extract has a better wormicidal effect than Petroleum ether extract with compared with the standard drug Albendazole. Further study is required to find out the novel phytoconstituents responsible for anthelmintic action against various helminthes.

#### **Anticancer Activity:**

**Salin gupta et al.,** was reported the Cytotoxicity of aqueous extract exhibited a strong antiproliferative activity against all cancer cell lines tested. The concentrations of growth inhibition at 50% (IC(50)) ranged from 7 to 25 mg raw material/ml after 48-hour treatment. The extract had a very limited cytotoxicity (10% inhibition) on the normal pancreatic cells even at the concentration of 50 mg/mL. Apoptosis in B16-F10 cells after treatment with the extract was observed by microscopic examination and DNA ladder assays [19]. Oral administration of the herbal extract effectively reduced B16-F10 cell growth in the lungs of C57Bl/j mice with a 70% reduction in lung metastases ( $p < 0.001$ ).

#### **Antihyperlipidemic Activity**

**Rajagopal PL et al.,** hypolipidemic and hypoglycaemic potentials of aqueous extract of *O. corymbosa* against alloxan-induced diabetes in rats. Phytochemical screening shows the presence of tannins, saponins, terpenoids and flavonoids. Total phenolic content was found to be  $22.85 \pm 0.21$  mg/g,  $IC_{50}$  is  $450 \pm 1.39$   $\mu$ g/ml and total flavonoids content was found to be  $4.25 \pm 0.09$  mg/g of extract [20]. The results of the present study showed that *O. corymbosa* can lower blood glucose and lipid parameters except for HDL. The levels of antioxidant enzymes CAT and GSH were increased along with the decreased in LPO level by the pre-treatment of animals with *O. corymbosa*. Microscopic examination of pancreatic sections revealed that diabetic rats treated with *O. corymbosa* extracts at either dose have normal architecture structure of islets. *O. corymbosa* may be effective as a hypoglycaemic and antihyperlipidemic agent.

#### **Anti-microbial Activity**

**Zahir Hussain et al.,** Anti-microbial activity of the methanolic extracts of root and aerial parts of the plant was subjected to antimicrobial activity against tested organisms both gram (+) and gram (-) [21]. The maximal bacterial activity is found *klebsiella* species and fungi activity is found in *candida albicans*.

#### **Antiviral Activity**

**Fujioka T et al.,** Since there are reports on the use of roots and leaves of the plant by ayurvedic practitioners as treatment for various viral ailments, the author of this review was interested in carrying out investigation on plant

extracts and bioactivity guided fractionation to confirm their activity. The preliminary study carried out using petroleum ether and chloroform extracts of the leaves showed a very good antiviral potential towards HSV-I and HSV-II against 2TCID<sub>50</sub> and 10TCID<sub>50</sub> challenging doses [22].

**Hideaki otsuka et al.,** reported the aerial parts of *Oldenlandia corymbosa*, nine iridoid glucoside derivatives were isolated. On spectroscopic investigation, five known compounds were identified, that is, deacetyl asperuloside, asperuloside, asperulosidic acid, deacetyl asperulosidic acid and scandoside methyl ester. The structures of four new compounds were determined to be acylated derivatives of the known compounds, that is, 10-O-benzoyl deacetyl asperulosidic acid methyl ester, and 10-O-benzoyl, 10-O-p-hydroxybenzoyl, and 10-O-p-trans, cis-coumaroyl scandoside methyl esters [23].

Asperuloside is also reported by **Muhammad Hanafi et al.,** for ability to shown high biological ac-tivity to growth inhibition against to YMB-1 and HL60 cell line with IC50 is 0.7 and 11.0  $\mu$ g/mL.

**Pawadee Noiarsa et al.,** also reported from the whole plants of *Oldenlandia corymbosa* of Thai origin, ten compounds have been isolated and elucidated as geniposide, 6 $\alpha$ -hydroxygeniposide, scandoside methyl ester (6 $\beta$ -hydroxygeniposide), asperulosidic acid, deacetylasperuloside, asperuloside, 10-O-benzoylscandoside methyl ester, 10-O-p-hydroxybenzoylscandoside methyl ester, (+)-lyoniresinol-3 $\alpha$ -O- $\beta$ -glucopyranoside, and rutin [24].

#### **CONCLUSION**

The phytochemical constituents and medicinal properties of *Oldenlandia Corymbosa* is available both in the written and non-written format as traditional knowledge since time ancient. In traditional medicines the plant has been used as treatment option against hepatoprotective, anti-inflammatory, anti-tumors, antioxidant, antibacterial, anti-viral, anti-ulcer, chemo protective and antiseptic etc. Several researchers have claimed that MA herb would be potential tool to cure many diseases or can be used as an adjuvant therapy. Traditional knowledge regarding the usage of this plant is many but the scientific research available today to support this knowledge is limited. Here we have tried to compile all the available information from both traditional and published scientific literatures regarding the medicinal uses of *olenlandia* species is important in interpreting the medicinal properties and pharmacological value of the species. It will helpful for the future researchers to get the information in a nut shell. This will provide tremendous opportunities for planning and conduct research related to various aspects of this medicinal plant.

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