

THERAPEUTIC UTILITY OF “*OLDENLANDIA CORYMBOSA* LINN.”

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Abstract

The term of medicinal plants include a various type of plants used in her balism that have medicinal activities. *Oldenlandia corymbosa* Linn. is considered being a medicinal plant since it contains ingredients which can be used in drug development and synthesis. The plant is also considered as an important source of nutrition and as a result of that this plants recommended for their therapeutic values.

Keywords: *Oldenlandia Corymbosa* Linn, Therapeutic Utility

Introduction

The universal role of plants in the treatment of disease is exemplified by their employment in all major system of medicine irrespective of the underlying philosophical premise. Plant based medicines have been in use against various diseases and disorders since time immemorial. The primitive man used herbs as therapeutic agents and medicaments, which they were able to procure easily. Nature has provided abundant plant wealth, which possess medicinal virtues for all living creatures. The essential values of some plants have long been published but a large number of them remain unexplored as yet.

***Oldenlandia corymbosa* Linn.**

The plant is from Rubiaceae family, which 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, oxytocic and anti malarial activity¹.
The plant is widely used in treating various diseases associated with kidney².

Taxonomic description³

Kingdom : Plantae

Phyllum : Angiosperms

Class : Dicotyledonae

Subclass : Asteridae

Order : Gentianales

Family : Rubiaceae

Subfamily : Rubioideae

Genus : Oldenlandia

Species : corymbosa

Plant description

Habit : A small herb, weed.

Leaves : Subsessile, linear-lanceolate, acute, recurved and hairy margins, stipulate, stipules membranous, truncate with a few bristles.

Inflorescence : Axillary solitary.

Flowers : White, small peduncles, pedicels 2-3 on the top, bract single below the pedicels. Calyx teeth 4, triangular, corolla lobes 4, acute, valvate. Stamens 4, in the throat of the corolla. Ovary 2-celled, ovules many, stigmas 2, linear.

Fruit : Capsule globose, seeds many.

Flowering and Fruiting Time : August – October

Regional Names

English : Diamond flower

Hindi : Daman pappar, Pitpapra (दमन पप्पड़)

Sanskrit : Parpata, Parpataka

Malayalam : : Parpatakapullu, Parpataka (പാപതാകപ്പുല്ലു പാപതാക)

Kannada: Parpata hullu (ಪರ್ಪಟ ಹುಲ್ಲು)

Tamil: Kattucayaver (காட்டுச்சாயவேர்)

Telugu: Vernnela-vemu (వెన్నెల వేము)

Synonyms

Hedyotis corymbosa

Hedyotis biflora

Gerontogea corymbosa

Gerontogea biflora

Gerontogea herbacea

Why Therapeutic utility?

The therapeutic utility of a plant is due to the presence of a particular chemical component or components present in it. This component is generally termed as active ingredient or chemical principle or active constituents or secondary metabolites. These principles are often accumulated in a particular morphological part of the plant or distributed throughout the plant. The part of the plant which shows maximum accumulation of these chemical principles are considered to be the source of drug from the plant. It may be leaf, stem, flower, fruit, bark, stem, rhizome, root or the entire plant.

The following are the most important secondary metabolites present in the plant, which could be responsible for the various medicinal properties.

From the whole plants of *Oldenlandia corymbosa*, 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. Their structures were determined on the basis of spectroscopic data⁴.

γ -Sitosterol and the triterpene acids, oleanolic acid and ursolic acid, have been shown to be present in the Indian medicinal plant *Oldenlandia corymbosa* Linn. Evidence is presented to show that the plant does not contain any alkaloid⁵.

The plant is also reported with alkaloids, carbohydrates, saponins, tannins, steroidal glycosides, flavonoid glycosides, phenolic compounds and coumarins⁶.

The freshly prepared crude extract was qualitatively tested for the identification of chemical constituents, such as, alkaloids, flavonoids, steroids, glycosides, saponins, terpenoids, gums and tannins⁷.

Pharmacological profile

Anti diabetic

The ethanolic extract of the plant have demonstrated significant increase in the anti oxidant activity and decreased the oxidative stress in SOD, CAT, GST and GPx. Hence the plant extract have considerable antioxidant activity comparable with glibenclamide. So the plant can be used effectively for the therapeutic management of diabetes ⁸.

Antipyretic

A study was conducted to screen antipyretic activity of the petroleum ether, ethyl acetate, butanone, butanol extract of the plant on yeast induced pyrexia model in albino rats. Different extracts obtained by successive soxhlet extraction like ether, petroleum ether, ethyl acetate, butanone, n-butanol, were subjected to acute toxicity studies. The extracts were screened for antipyretic activity by yeast induced pyrexia model in albino rats. Results from the study suggested that among the various extracts used in the study, only petroleum ether extract did not shown any significant antipyretic activity, whereas other extracts like ethyl acetate, butanone, n-butanol, solvent ether showed significant antipyretic activity compared with paracetamol treated group. Hence the study indicate the potential usefulness of the plant in the treatment of fever ⁹.

Abortifacient activity

Cumulative doses of plant extracts were added to rat uterine tissue in an organ bath, and the force and frequency of contractions were recorded. Acetylcholine was used as positive control. The strongest contraction comparable to the maximum response obtained with acetylcholine was observed in the plant extract^{1,10}.

Anticancer

The ethanolic extract of leaves of *Oldenlandia corymbosa* has shown significant anticancer activity on k562 human leukemia cell lines. The cell viability was measured by SRB (sulforhodamine B) assay. The cell lines were grown under RPMI1640 medium containing 2 mM-L-glutamine, 10 % fetal bovine serum. The results were recorded on ELISA plate reader at 540 nm to 690 nm wavelength. The non toxic dose of *O.corymbosa* showed anticancer activity as compared to the standard drug adriamycin ¹¹.

Anthelmintic

The ethanolic extract of the plant when tested for possible anthelmintic activity to determine the paralyzing and death time on the aquarium worm, *Tubifex tubifex*. The ethanolic extract showed anthelmintic property comparable to the reference drug piperazine citrate at 80 mg/ml. Various phytochemical tests performed on the ethanolic extracts suggest that the plant contains reducing sugars, amino acids, steroids, flavonoids, alkaloids and glycosides which could be responsible for the anthelmintic activity ¹².

Antiulcer

The alcoholic and aqueous extract of whole plant has shown significant antiulcer activity against aspirin in rats. The extracts were administered in two doses 200 mg/kg and 400 mg/kg by oral route 45 minutes prior to the administration of aspirin. The standard drug lansoprazole 8 mg / kg was used for the comparison. Both the alcoholic and aqueous extracts showed significant decrease in ulcer compared to control group. The protection percentage in alcoholic and aqueous extract at 200mg/ kg, 400mg/kg showed 65.7%, 33% respectively in comparison with standard lansoprazole 88.89% ¹³.

Neuroprotectant

The metabolic extract of whole plants of the plant yielded five flavonol glycosides, kaempferol 3-*O*-[2-*O*-(6-*O*-*E*-feruloyl)- β -d-glucopyranosyl]- β -d-galactopyranoside (1), quercetin 3-*O*-[2-*O*-(6-*O*-*E*-feruloyl)- β -d-glucopyranosyl]- β -d-galactopyranoside(2), quercetin 3-*O*-[2-*O*-(6-*O*-*E*-feruloyl)- β -d-glucopyranosyl]- β -d-glucopyranoside(3), kaempferol 3-*O*-(2-*O*- β -d-glucopyranosyl)- β -d-galactopyranoside (4), and quercetin 3-*O*-(2-*O*- β -d-glucopyranosyl)- β -d-galactopyranoside (5), and four *O*-acylated iridoid glycosides (6–9). Compounds 1 and 2 are previously unreported natural products, and all nine compounds exhibited significant neuroprotective activity in primary cultures of rat cortical cells damaged by l-glutamate ¹⁴.

Antioxidant

The antioxidant activity of methanolic extract of aerial parts of the plant was determined by different *invitro* methods such as; 1,1 diphenyl-2-picryl hydroxyl (DPPH) assay, 2,2'-azinobis-3-ethylbenzothiozoline-6-sulfonic acid (ABTS) cation decolorization test, ferric reducing power (FRP), scavenging capacity towards hydroxyl ion (OH.) radicals

and nitric oxide (NO) radical inhibition assay. The methanolic extract of aerial part showed high antioxidant activity against DPPH, ABTS, Nitric oxide and hydroxyl radical at 82, 130, 150, 170 µg/ml respectively. The study showed that the plant extract effectively attenuates the oxidative stress via antioxidant property ¹⁵.

Analgesic

Oral dose of 250 and 500 mg/kg of ethanolic extract of the plant showed significant analgesic activity in mice using three different models like; hot plate reaction time, acetic acid writhing test and formalin induced pain method, with ketorolac as standard drug. Formalin test procedure revealed the involvement of both peripheral and central mechanism. The acetic acid writhing test involved the peripheral mechanism and the hot plate method involves the central mechanism. The ethanolic extract of *O.corymbosa* showed significant antinociceptive effect in 250 and 500 mg/kg, but more significant effect was observed at 500 mg/kg ⁷.

Hepatoprotectant

The plant showed significant hepatoprotective activity against Perchloroethylene, Carbon tetrachloride and D-Galactosamine induced liver damage in experimental animals. Hepatoprotective action of ethanolic extract of *Oldenlandia corymbosa* on perchloroethylene induced hepatic damage was studied in wistar albino female rats. The extract was administered orally at the dose of 400 mg/kg of body weight for ten days, showed significant reduction in liver marker enzymes (AST, ALT, LDH), lipid peroxidation and with significant increase in antioxidant enzyme levels. The results indicates that the plant have potent hepatoprotective activity upon perchloroethylene induced hepatic damage in rats and also have antilipidperoxidative and free radical scavenging activity ¹⁶.

Anti malarial

Antimalarial activity of the methanolic extract of the plant was studied by both *invitro* and *invivo* methods. The plant extract showed significant antimalarial activity on chloroquine sensitive (MRC-pf20) and chloroquine sensitive (MRC-pf.303) stains of plasmodium falciparum. *Invivo* antimalarial activity of the plant was studied using mice. Drug treatment was initiated 1 day prior to the parasite treatment starting from 4thday of post infection.

Every alternate day, the blood was collected from tail to check the level of parasitaemia. The combination of plant extract with curcumin showed more effective antimalarial activity¹⁷.

Antibacterial

Methanolic extract of the plant was evaluated for its antibacterial activity by disc diffusion method against gram positive and gram positive bacteria (Bacillus, Klebsiella, Escherichia coli, proteus, staphylococcus aureus and pseudomonas). The plant extract was observed to inhibit the growth of both gram positive and gram negative bacteria significantly and has broad spectrum of antibacterial activity. The order of inhibition was found to be Proteus (22mm) < Pseudomonas (26mm) < Bacillus (27mm) < Staphylococcus aureus (28mm) < Escherichia coli (32mm) < Klebsiella (33mm)⁶.

Neutraceutical

The most common antioxidants present in herbs are vitamins C and E, carotenoids, flavonoids and thiol (SH) compounds, etc. There were several reports that highlight the contribution of phenolic compounds and ascorbic acid to antioxidant activity. The present investigation suggests that the major source of antioxidant capacity of *Oldenlandia corymbosa* is both ascorbic acid and phenolic compounds. 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 phytochemicals, 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 such as vitamin C or vitamin E¹⁸.

Antifungal

The whole plant extract showed significant antifungal activities against *Candida albicans* and *Aspergillus niger*. The maximum antifungal activity was found in *Candida albicans*. The Antifungal activity was due to the presence of the constituents like, steroids and glycoside⁶.

Uterine Contraction

The ethanolic extract of the plant showed significant effect on uterine contraction, this was observed in the isolated uterine horn preparation of virgin female sprague dawley rat. The extracts were tested in different concentration 0.014, 0.14, 0.44 and 1.40 mg/ml. De. Jalon solution was used as the physiological solution and the response was compared against the standard (acetylcholine) and blank (ethanol). This study reveals that the plant has significant uterine contraction ¹⁰.

Diuretic activity

The acute toxicity test was carried out with 70% ethanolic extract of the plant by using albino mice. It was observed that the 70% ethanolic extract was free from acute toxicity or harmful effect during observation period of 2-weeks even with maximum permissible dose of 16g/kg. Diuretic activity of 70% ethanolic extract of the plant was tested by using albino rats at 6g/kg dose. The results showed that the plant has significant diuretic activity¹⁹.

In treating rheumatoid arthritis

It is a chronic multisystem disease characterized by hyperactivity of certain immune reactions, persistent synovitis with diffuse proliferation, and, in most of the cases, deposition of auto antibodies to immune globulins known as rheumatoid factor. The whole plant can be used for treating rheumatoid arthritis ²⁰.

Besides these reported medicinal uses, the plant is traditionally used for treating various diseases. The plant is a rich source of vitamin C. South east asian countries, the decoction of the whole plant is used to treat fevers and stomach ache. The decoction of the plant can be taken internally and applied externally to the skin to treat heat eruptions. In Martinique, a tincture of the roots is used as a vermifuge. In India, juice from the plant is mixed with sugar and milk and used to treat digestive disorders. The plant is also used to treat jaundice and other liver problems and even leprosy and bronchitis. In the Congo, it is used to facilitate childbirth. In Chinese medicine, it is used to treat viral infections, cancer, acne, boils, appendicitis, hepatitis, eye problems and bleeding. In certain countries it is used as a mouthwash for toothache.

References

1. Himangshu Sekhar Maji, Sushomasri Maji, Kausik Bhar, Jaishree Chandra Manik Baral, Pranabesh Chakraborty and Sujata Ghosh Dastidar. Anthelmintic, Free-Radical Scavenging Property and Potent Antibacterial Activity of Flavonoid Fraction Isolated from the Whole Plant of *Oldenlandia corymbosa* L. International Journal of Biomedical and Pharmaceutical Sciences. 2011; 5 (1):43-48.
2. <http://ayurvedicmedicinalplants.com>.
3. Khastgir H N, Sengupta S K and Sengupta P. Note on the constituents of the Indian medicinal plant *Oldenlandia corymbosa* linn. Journal of the American Pharmaceutical Association.1960;49(8):562–563.
4. Khushbu Pandey, Pramod K. Sharma, Rupesh Dudhe, Anticancer Activity of *Parthenium hysterophorus* Linn and *Oldenlandia corymbosa* Lam by SRB Method.2012;1(6):12, 1-3.
5. Kirti Mishra, Aditya P Dash, Bijay K Swain, Nrisingha Dey, Anti-malarial activities of *Andrographis paniculata* and *Hedyotis corymbosa* extracts and their combination with curcumin, Malaria journal.2009;8(26):1-9.
6. Nesamony S, Medicinal Plants. State institute of languages, Nalanda, Thiruvananthapuram, 2001; 342-345.
7. Noiarsa P, Ruchirawat S, Otsuka H, and Kanchanapoom T. Chemical constituents from *Oldenlandia corymbosa* L. of Thai origin. J Nat Med. 2008;62(2):249-50.
8. Pranjali Sarmah, Aniruddha Sarma, Archana Kalita, Debaleena Kashyap and Shally Sultana Choudhury. Nutraceutical properties and antioxidant activity of *Oldenlandia corymbosa* l. found in brahmaputra valley agro- climatic conditions. World Journal of Pharmacy and Pharmaceutical Sciences.2014;3(9):586-592.
9. Rajshekar Chimkode, Patil M. B, Sunil Jalalpure, Pasha T Y and Sibaji Sarkar. A study of antipyretic activity of *Hedyotis corymbosa* Linn. in Albino rats. Biomed. 2008; 3(3/4): 234-238.
10. Ramprasad R, Madhusudhan S and Kalaichelvan V.K. In vivo antioxidant activity of ethanolic extract of *Oldenlandia corymbosa* Linn. On streptazotocin with nicotinamide induced oxidative stress in wistar rats. International Journal of Research in Pharmaceutical Sciences. 2017;8(1):82-89.
11. Rathi MA, Baffila pearl DL Sasikumar JM and Gopalkrishnan VK. Hepatoprotective activity of ethanolic extract of *Hedyotis corymbosa* on perchloroethylene induced rats.Pharmacologyonline. 2009; 3:230-239.
12. Sasikumar JM, Maheshu V, Smilin Bell G and Aseervatham D. Teepica Priya Darsini, Invitro antioxidant activity of *Hedyotis corymbosa*(L.) Lam. aerial parts. Indian Journal of Biochemistry & Biophysics.2010;47:49-52.
13. Sorabhkumar Agrawal, Evaluation of Antiulcer activity of *Oldenlandia corymbosa*(L). Int.j,Res,Dev.Pharm,L.Sci. 2013;2(2): 363-367.
14. Sridevi Sangeetha Kothandaraman, Sivapraksam Kavitha Karunakaran, Umamaheswari Subburaya,Sujatha Kuppasamy, and Subashini TS. A Review on Phytochemical and Pharmacological Profile of *Hedyotis corymbosa* Linn. Int. J. Pharm. Sci. Rev. Res.,2014; 26(1): 320-324
15. Subramoniam A, Madhavachandran C and Gangaprasad A. Medicinal plants in the treatment of arthritis. Annals of Phytomedicine.2013; 2(1): 3-36.
16. Tanvi Patel Vineet Jain and Rajesh Dodia. *Oldenlandia corymbosa* L.: A Phytopharmacological review. International Journal of Phytopharmacy.2004; 4 (3):79-82.
17. Tine Nikolajsen, Frank Nielsen, VibekeRasch, Pernille H. Sørensen,Flora Ismail, Uffe Kristiansen, Anna K. Jäger, Uterine contraction induced by Tanzanian plants used to induce abortion. Journal of Ethnopharmacology. 2011; 137:921–925.
18. Ummul Khyer Fatema MD. Selim Hossain, Analgesic effect of ethanol extract of *Hedyotis corymbosa* L. Whole plant. Int. Res. J. Pharm,5 (1), 2014;21-24.
19. Youngleem Kim,Eun Jung Park, Jinwoong Kim, Yang-Bae Kim,So Ra Kim, and Young Choong Kim. Neuroprotective Constituents from *Hedyotis diffusa*. Journa of Natural Products. 2001;64 (1):75–78.
20. Zahir Hussain A and Kumaresan S, Phytochemical and antimicrobial evaluation of *Oldenlandia corymbosa* , Asian J. Plant Sci. Res, 3(4), 2013; 155-158.