Review Article

International Journal of Research in Pharmaceutical Sciences

Published by JK Welfare & Pharmascope Foundation Journal Home Page: www.ijrps.com

Olax scandens: The Plant of The Researchers- A Review

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Article History:

Received on: 13 Sep 2020
Revised on: 09 Oct 2020
Accepted on: 21 Oct 2020

Keywords:

Olax,
Antipyretic,
Pharmacology,
Laxative

Abstract

Plants had been a source of food for human beings from the start of the evolution of mankind. Besides food, herbs served us as the source of medicines to treat ailments. Plants had been investigated for the chemical moieties that are potent in treating many diseases. With the development of science and technology, there had been various drugs, synthesized to treat diseases. But the chemicals that were synthesized had serious adverse effects and side effects. So there has been a focus on herbs and medicinal plants in search of the alternatives for synthetic drugs. In this paper, *Olax scandens* had been reviewed for its Pharmacognostic, Phytochemical and Pharmacological profiles which revealed the presence of various phytoconstituents like glycosides, tannins, phenols, flavonoids, alkaloids etc. Few areas include the Himalayas and sub-Himalayan regions like northern parts of Bihar, Kumaon. The plant also grows widely in Deccan forest and the Western Ghats. The plant is native to countries like India, Srilanka, Bangladesh, Malaysia, Burma, Thailand, Vietnam and Java. Olax is s scandent shrub which grows to 5m height. The leaf is simple, alternate and oblong with the lanceolate surface. The inflorescence is axillary, racemose and panicle. The flowers are white, and the fruits are drupes and ovoid in shape. The plant was proven to exhibit anti-bacterial, laxative, anti-inflammatory, anti-diabetic, antipyretic activities.

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ISSN: 0975-7538

DOI: https://doi.org/10.26452/ijrps.v12i1.4096

Production and Hosted by

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INTRODUCTION

Plants had been a source of food for human beings from the start of the evolution of mankind. Besides food, herbs served us as the source of medicines to treat ailments. Plants had been investigated for the chemical moieties that are potent in treating many diseases. Before the advent of technology into medicine, plants had been used in the traditional medical systems like Ayurveda, Siddha, Unani, homeopathy, Chinese medicine etc. Even before the use of drugs in traditional medicine, herbs have been used in the folklore systems. There were numerous reported documents which suggest the traditional uses of herbs. But these claims had not been properly evaluated and investigated till recent past. Several chemical constituents have been isolated from plants.

With the development of science and technology, there had been various drugs, synthesized to treat diseases. But the chemicals that were synthesized had serious adverse effects and side effects. So there has been a focus on herbs and medicinal plants in search of the alternatives for synthetic drugs. There

were numerous publications which prove the safety and potency of the herbs. In this view, several works have been done to probe the medicinal plants for disease treating properties, and several review articles were published to document the pharmacological properties of the plants.

In this review, the plant *Olax scandens* was reviewed for the research activities and the chemistry work done on the plant. This review article is the consolidation of all the research work that was performed on Olax scandens.

PLANT PROFILE

Botanical name

Olax scandens Roxb.

Synonyms

Olax. In Ayurveda, it is called as Dheniaani, Karbudaar, in Siddha as Malliveppam, Kadalranchi. In follore, it is called a Rimil-Beer plant.

Below is the taxonomical status of the plant (Scandens, 2019).

Habit and Habitat

The plant is a scrub that grows widely in hills and higher altitude areas. Dry deciduous forests with vivid and very high moisture are home for this plant in various countries (Khare, 2007).

Few areas include the Himalayas and sub-Himalayan regions like northern parts of Bihar, Kumaon. The plant also grows widely in Deccan forest and the Western Ghats. The plant is native to countries like India, Srilanka, Bangladesh, Malaysia, Burma, Thailand, Vietnam and Java.

Plant description

Olax is s scandent shrub which grows to 5m height. The leaf is simple, alternate and oblong with the lanceolate surface. The inflorescence is axillary, racemose and panicle. The flowers are white, and the fruits are drupes and ovoid in shape.

Traditional Claims

Traditionally the plant is used to treat anemia, and there are folklore claims to treat diabetes. Olax is also used to treat fever and other symptoms (Khare, 2007). The fresh and young leaves were cooked as a leafy vegetable and chewing the leaf cause curing of mouth ulcer. They are used to treat headaches when applied as paste (Acharya *et al.*, 2015). Fruits are edible when they are ripe. The stem bark is claimed to treat cough and fevers (Acharya *et al.*, 2015). The decoction was made from the plant's stem and was used traditionally to treat kidney diseases like stones and inflammations (Swamynathan and Ramamoorthy, 2011).

The plant is also claimed to be used to treat smallpox, intestinal disorders and measels. There are reports that claim for its use to treat liver problems. It is used as a natural blood purifier. The plant extracts were also used to cure psoriasis in traditional medicine (Ovais *et al.*, 2018). The parts of the plant like roots, stems and flowers are used to relieve stomach-ache and were used to control diarrhoea (Sreeramulu *et al.*, 2013).

PHARMACOGNOSTIC PROFILE

The leaves were studied, and the pharmacognostic profile of the leaves was established, which showed the presence of trichomes, vascular bundles and collenchymatous tissue. Stomata of paracytic type, rosettes and prisms of calcium oxalate crystals and unicellular trichomes were present in the powder microscopy of the dried leaves (Naik *et al.*, 2015).

Table 1: Taxonomical status of the plant

Taxonomical status	Plant
Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Santalales
Family	Olacaceae
Genus	Olax
Species	scandens

Chemistry of the plant

Olax scandens had been reported to contain Tannins and alkaloids in variable concentrations in roots and bark of the plant. Flavonoids and phenols had been isolated from the roots of the plant, which were believed responsible for the antibacterial activity of the plant (Owk and Naidu, 2016). The preliminary phytochemical screening of the Leaves proved the presence of Carbohydrates, Saponins, Tannins, Alkaloids but Terpenoids, Glycosides, Flavonoids and Phenols are absent in the leaves. The dried leaf powder showed the presence of all the nutrients like proteins, carbohydrates and fats. The leaves have rich minerals like magnesium, calcium, zinc and phosphorus in varied proportions (Naik *et al.*, 2013).

The ethanol extract of the fruit of Olax had been investigated and isolated for the chemical constituents like flavonoids, coumarins, cardiac glycosides, quinones, anthraquinones and also terpenoids. There were also phytosterols and saponins that were common in leaves, too (Prabhakar and Kamalakar, 2014). There are isolated molecules

from the plant. Saponin glycoside, Olaxoside was isolated from the plant leaves (Forgacs and Provost, 1981). The plant had been isolated for other constituents that belong to the phytosterol class like sitosterol, β-sitosterol and fatty acids like aleanoic acid and oleanolic acid were isolated from the HPLC fingerprinting analysis (Ovais *et al.*, 2018).

Pharmacological activities

Acute Oral Toxicity

The plant leaves had been investigated for acute oral toxicity using OECD guidelines and proved that the leaf extract was found to be safe at a concentration of 200mg/kg of body weight (Raghavendra *et al.*, 2015).

Antimicrobial activity

Olax scandens roots had been investigated for the antimicrobial activity using Agar Well Diffusion Method and Two-fold Serial Dilution Method. Solvents like Chloroform, Hexane, Distilled water and Methanol were used for extraction of the roots. The plant showed good activity against Bacillus subtilis, Micrococcus luteus, Enterococcus faecalis, Proteus Vulgaris, Staphylococcus aureus, Candida albicans and Aspergillus niger. The MIC values were very low at 125μg/ml for the antibacterial activity. The root extracts were also effective against drug-resistant bacteria like Staphylococcus, Escherichia and other disease-causing fungi too (Owk and Naidu, 2016).

Antipyretic Activity

The stem bark of the plant *Olax scandens* was investigated for the antipyretic activity using the pyrogens yeast method in albino Wistar rats. The dose of 540mg/kg was tested against the pyrexia induced by Brewer's yeast. There was a significant reduction in the rectal temperature only after 9hrs of the administration. The rectal temperature was not significantly lowered when studied for 6hrs (Naik *et al.*, 2015).

Antioxidant Activity

The leaves of the plant were dried and tested for the antioxidant activity invitro using DPPH free radical scavenging activity. This showed the antioxidant capacity of the leaf was 100.45mcg, which was compared with the standard drug Ascorbic acid. The leaves had been investigated for the phytochemistry and were given in the chemistry section of this article (Naik *et al.*, 2013).

In another study, different extracts of the aerial parts of Olax were investigated for antioxidant activity in Hydroxyl Free radical scavenging activity (OH) and Nitric oxide free radical scavenging activity (NO). The phosphomolybdic acid method was used to test the activity, and Ascorbic acid was used as a standard drug in this method. Out of all the extracts, methanol extract was proven potent, and the activity was in a concentration-based manner (Pranaya and Devi, 2020).

Laxative Property

Leaves of the plant Olax had bee investigated for the laxative effect based on the traditional claims. The investigation as carried out a dose of 1300mg/kg using kaolin expulsion test in experimental mice. The intestinal transit time was calculated, and the latency of the expulsion of the kaolin from the faeces was estimated. Results showed that the extracts produced significant intestinal motility and the rapid clearance of the kaolin (Raghavendra *et al.*, 2015).

Anti-inflammatory activity

The saponin glycoside that is isolated from the plant was investigated for the anti-inflammatory property, and the results showed potent activity against the inflammations that are usually caused in the human body (Forgacs and Provost, 1981).

Other Uses

Ayurvedic formulation

The plant has been used in the Ayurvedic Formulation, Kudineer in Southern India along with seven other herbs which include Syzygium, Terminalia, Cyperus etc. this formulation was used in the treatment of diabetes and effectively fighting of the infections caused by bacteria and fungi (Rajalakshmi *et al.*, 2018).

Green Synthesis

Silver Nanoparticles had been synthesized using the extracts of the plant as a part of green synthesis. The characterizations and activities were analysed for the produced particles. The anti-bacterial activity of the produced silver nanoparticles was evaluated and was found higher in case of drug-resistant bacteria (Mujeeb *et al.*, 2020).

These nanoparticles produced in a similar fashion were investigated for the anti-cancer activity in the Chinese hamster ovary cells (CHO-cells) and found that the nanoparticles exhibited significant cytotoxicity in the cell lines of A549 and B1F10 melanoma cell lines. They showed lower activity in the CHO cells and HUVEC cells. H9C2 Cardiomyoblast cells also were inhibited but not as effective as other cell lines (Mukherjee *et al.*, 2014).

Bio-diesel

The seeds of the plant Olax were used for biodiesel production. Scientists worked towards the standardization of the extracted oil from the seeds and

esterification of the oil. The oil that was extracted was analysed by using gas chromatography, and the engine compatibility was also tested. The result of the research showed a blend of 10% and 20% of seed oil with either petrol or diesel as compatible with the existing engines. There was no need for eh change in the existing hardware too. It was found that there was a minor loss of engine efficiency and power (Mohapatra *et al.*, 2017).

CONCLUSIONS

Olax scandens is one of such plants that are used traditionally for treating various types of ailments. The folklore claims of the uses of the plants were considered to investigate for the activity. Based on these investigations and claims, investigators may utilize and prove the information given in the paper.

Funding Support

The authors declare that they have no funding support for this study.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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