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Review Article

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Pharmaceutical properties of genus Olacaceae: A Review

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ABSTRACT

Olacaceae family constitutes 30 genera and 250 species. The family comprises of tropical, woody, autotrophic or root hemi parasitic plants wide spread in tropic and sub-tropical region. Therefore in this review we are aimed to provide comprehensive information in all the reported ethano medical properties of the plants belonging to family Olacaceae.

Keywords: Olacaceae, Medicinal plants, Ethano medical properties, Phytochemicals, Secondary metabolites.

INTRODUCTION

Health is considered as a blessing, a natural bi-product of an orderly normal and proper life style. A perfect person with a perfect health without any ailments or health concerns were said to be in a blessed state of living. Any changes, disruptions or disturbances in the functioning of one system though not initially but ultimately effects the efficient working of the entire body that was wonderfully master crafted machine that we live in. Health problems are becoming more common than ever in the world today. The principal causes for common health issues now-a-days are unhealthy diet, lack of exercise, environmental degradation, high stress levels and of course number of microbial infections. Synthetic drugs often used act in the body as irritants and toxins upsetting the balance of the whole system producing the side effects that could sometimes be lethal. By contrast, the regular and judicious use of herbs to protect and promote health and as medicines to help treat common ailments is an enlightened approach to personal well-being (Tyler, 2000).

The plant-derived medicines are generally considered to be safer, gentler and better for human health than synthetic drugs. Plant derived substances are the most widely used medicines in the world and about 80% of the world's population uses herbs as the primary medicine. The term "Herbs" refers to plants or their parts that are used for their therapeutic and health enhancing properties. The proper and judicious use of herbs is often useful in the treatment of illness. Herbs demonstrate great versatility for the treatment of broad variety of health needs. Natural plant-based remedies are used for both acute and chronic health problems from treating common cold to controlling blood pressure and cholesterol (Schulz et al., 2001).

Family Olacaceae comprises a diverse range of plant species with medicinal properties. Most of the species are used as a folk medicine in tribal areas. The present review provides information on the medicinal properties of Plants belonging to this family.

LITERATURE REVIEW

Phytochemicals

Medicinal plants have bioactive compounds which are used for curing various human diseases.

Phytochemicals are two categories preliminary and secondary constituents. Preliminary constituents have chlorophyll, proteins, sugars, and amino acids. Secondary constituents contain alkaloids, steroids, terpenoids, flavonoids, xanthones, and coumarins etc (Wadood et al., 2013).

Phytochemicals were extracted using different solvents and different methods were employed to yield crude extracts. Prabhakar and Kamalakar (2014) evaluated different extracts of *Olax scandens*, according to their study flavonoids were present only in ethanolic extract, saponins were present in methanol and aqueous extract and steroids and quinones were present in only the methanol extract. Coumarins and cardiac glycosides were absent in the methanol extract. Resins, amino acids and fixed oils were absent in all the extracts. Majumder et al. (2015) evaluated methanolic leaf and stem extract of *Olax. psittacorum* (Lam.) and reported the presence of carbohydrates, reducing sugars, flavonoids, glycosides, proteins, amino acids, saponins, steroids and tannins. Terpenoids were absent in the stem extract while alkaloids were absent in both stem and leaf extract.

Orabueze et al. (2016) screened methanolic extract of *O. subscorpioidea* Oliv and reported the presence of alkaloides, saponins, tannins, cardiac glycosides, phenols, steroides, carbohydrates and antraquinones were absent. The presence/absence of phytochemicals in the plant extracts are responsible for the significant therapeutic activity.

Araujo et al. (2008) reported the presence of Steroids, oleanolic acid, sesquierpinoids in the ethanolic stem extract of *Ximenia americana*. Leaf, root, stem and bark of *X. americana* comprises potential secondary metabolites. Geyid et al.,2005, James et al.,2007 Maikai et al.,2009 screened different parts of *X. americana* and their study indicated the presence of saponins, flavonoids, tannins, terpenoids, steroids and alkaloids in chloroform, methanol, ethanol and aqueous extract of leaf, root, stem and bark of *X. americana.*

Antioxidant activity

Damage to cells caused by free radicals is believed to play a central role in the aging process and in disease progression. Antioxidants are our first line of defense against free radical damage and are critical for maintaining optimum health and wellbeing. The need for antioxidants becomes even more critical with increased exposure to free radicals. Overall, free radicals have been implicated in the pathogenesis of at least 50 diseases. Fortunately, free radical formation is controlled naturally by various beneficial compounds known as antioxidants. It is when the availability of antioxidants is limited that this damage can become cumulative and debilitating (Percival, 1998). DPPH radical scavenging activity and Ferric ion reducing potential are the two commonly used parameters to evaluate the antioxidant potentiality of the plant extracts. Naik et al. (2015) reported significant DPPH radical scavenging activity of *Olax scandens* leaf extract.

Antimicrobial activity

Sagayaraj and Britto (2014) screened leaf extracts of ethanol, petroleum ether and dichloromethane of *Olax imbricata* Roxb for antibacterial and antifungal activity by using agar disc diffusion and well diffusion method. The ethanolic leaf extract potent inhibitory activity against *Staphylococcus aureus*, *Streptococcus faecalis* and gram negative bacteria *viz*., *Vibrio cholerae, Pseudomonas aeruginosa Klebsiella pneumoniae* and *Proteus vulgaris* also showed wider range of inhibition. The aqueous extract showed maximum inhibitiory effect against all the tested bacteria. The methanolic and ethanol extracts of leaves showed high antibacterial and antifungal activity against all the tested microorganisms. It is evident that the methanolic extract is active against Gram negative but more active against Gram positive bacteria at low concentrations.

Abdulazeez et al. (2015) worked with the leaves of *Olax subscorpioidea* extracted with n-hexane, chloroform, ethyl acetate and methanol. The antibacterial activities of these fractions were determined against *Escherichia coli, Staphylococcus aureus, Salmonella typhi* and *Klebsiella pnuemoniae* at 10 mg/disc, 5 mg/disc, 2 mg/ml and 1 mg/disc. The fractions indeed, demonstrated broad activity against all the tested bacteria and the activities of the fractions were concentration dependent. It was concluded that the presence of the secondary metabolites in the plant sample and the activities of the plant fractions justified the use of the plant as an antibacterial therapy by traditional disease healers.

Phukan and Chetia (2015) synthesized silver nanoparticles using *Olax acuminata* Wall. ex Benth. Leaf extract. These silver nano particles were characterized by FTIR, XRD, TEM and SEM. The antibacterial activity was evaluated using four bacterial species *Staphylococcus aureus, Bacillus subtilis, Pseudomonas aeruginosa, E. coli* at four concentrations and was assessed by the zone of inhibition. The highest activity was found against *S. aureus* and it was also found that the bacterial growth became significantly reduced in a dose dependent manner.

Majumder et al. (2015) evaluated *Olax psittacorum* for its antioxidant and antimicrobial activity. The aim of his study was to compare the

methanolic extracts of stem and leaf with regard to their antioxidant and antimicrobial activities. The antimicrobial activity was determined by well diffusion method on both gram positive and gram negative bacteria and fungi. The results reported that the stem methanolic extract of *O. psittacorum* exhibited more activity than the leaf methanolic extract.

Methanolic extract of *Ximenea americana* inhibited the growth of *Neisseria gonorrhea* and showed anti-fungal activity on *Candida albicans* and *Cryptococus neoformans* Geyid et al., 2005. Ogunleye 2003 evaluated the antibacterial activity of *X.americana* and found significant inhibition on *Pseudomonas aeruginosa*, and *Basillus subtilis*.

Hepatoprotective activity

Hepatotoxicity is first induced in the experimental animals as a prerequisite for evaluation of the hepatoprotective activity of any drug or plant extract. The biochemical parameters frequently used as indicators of hepatotoxicity are the serum Aspartate amino transferase (AST), Alanine amino transferase (ALT), Alkaline phosphatase (ALP), Total Bilirubin, Gama glutamate transpeptidase (GGTP) and total bilirubin (TBL); The elevated levels of these enzymes indicates toxicity (Akki et al., 2014; Brai et al., 2014; Venkateswararao et al., 2011). Nwaigwe et al. (2012) studied the hepatoprotective activity of *Olax viridis.* And reported that oral administration of the methanolic extract significantly reduced the toxicity.

Konan et al. (2015) investigated the hepatoprotective activity of *O. subscorpioidea* in carbon tetrachloride (CCl4) induced hepatotoxicity in rats. The plant extracts at doses of 25 and 100 mg/kg b.w. as well as silymarin (25 mg/kg b.w.) were intraperitoneally (i.p.) injected once daily for 7 days to different groups of rats. Hepatotoxicity induced through CCl4 was well manifested by significant increase in serum activities of GOT, GPT, ALP and GGT, and enhancement of total bilirubin and TBARS levels. Pretreatment with plant extracts and silymarin prevented the toxic effects of CCl4 by decreasing serum enzyme activities, total bilirubin and TBARS levels.

Venkateswara rao et al., 2011 screened the aquoeus leaf extract of *X. americana* for its hepatoprotective activity aganist acetamenophen toxicity. The extract significantly normalized the elevated enzyme levels thus exhibiting its hepato protection.

Hypoglycemic/Anti-hyperglycemic activity

Alloxan (2,4,5,6-Tetraoxy pyramidine,5,6 dioxy uracil)and Streptozotocin are widely used to induce experimental diabetes in rats as a pre-requisite for testing the drugs against diabetes in laboratory animals.

Rynjah et al. (2016) evaluated the hypoglycemic and anti-hyperglycemic effect of aqueous-methanolic extract of *Olax acuminata* Wall ex Benth. Leaves in normoglycemic and alloxan-induced diabetic mice. For hypoglycemic study, normoglycemic mice were administered with varying doses of extracts and the optimal dose was selected for glucose tolerance test. For anti-hyperglycemic study, the optimal dose of extract was administered to diabetic mice and glucose tolerance test was also performed. At the dose of 250 mg/kg b.w., *O. acuminata* leaves extract showed significant reduction in the blood glucose level in normoglycemic and diabetic mice Glucose tolerance was also improved in both normoglycemic and diabetic mice on administration of the extracts. The aqueous-methanolic leaves extract of *O.accuminata* demonstrates hypoglycemic and anti-hyperglycemic effect, thus, could be promising plant in the treatment of diabetes.

Anticancer activity

Mukharji et al. (2014) designed a simple and efficient green chemistry approach for the synthesis of colloidal silver nanoparticles (b-AgNPs) that is formed by the reduction of silver nitrate ($AgNO_3$) solution using *Olax scandens* leaf extract. The colloidal b-AgNPs, characterized by various physico-chemical techniques exhibit multifunctional biological activities (4-in-1 system).

Firstly, bio-synthesized silver nanoparticles (b-AgNPs) shows enhanced antibacterial activity compared to chemically synthesize silver nanoparticles (c-AgNPs). Secondly, b-AgNPs show anti-cancer activities to different cancer cells (A549: human lung cancer cell lines, B16: mouse melanoma cell line and MCF7: human breast cancer cells) (anti-cancer). Thirdly, these nanoparticles are biocompatible to rat cardio myoblast normal cell line (H9C2), human umbilical vein endothelial cells (HUVEC) and Chinese hamster ovary cells (CHO) which indicates the future application of b-AgNPs as drug delivery vehicle. Voss et al., 2006 reported the significant anticancer activity of *Ximenia americana* aqueous extract on breast cancer cell line.

CONCLUSION

The family Olacaceae exhibited the presence of potential secondary metabolites. Further, *in vitro* and *in vivo* investigation of the pure compounds are required. Hence there is a hope for the development of new, novel and more powerful commercial drug from the above plants of the

family Olacaceae to treat different human ailments.

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