A COMPREHENSIVE REVIEW ON PHARMACOLOGICAL ACTIVITY OF
VERNONIA ANTHELMINTICA AND CORALLOCARPUS EPIGAEUS

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ABSTRACT
Medicinal plants have played an essential role in the development of human culture. Medicinal plants have been used in virtually all cultures as a source of medicine. Assurance of the safety, quality, and efficacy of medicinal plants and herbal products has now become a key issue in developing countries. The aim of this review is to analyze published data on the pharmacological profile of plants, Vernonia anthelmintica and Corallocarpus epigaeus. The major scientific databases including Science direct, Cab direct, CeRA, Proquest and Google Scholar were queried for information on Vernonia anthelmintica and Corallocarpus epigaeus using various keyword combinations. Vernonia anthelmintica Wild (Compositae) has been used for curing asthma, inflammatory swellings, sores, and itching of the eyes, while rhizomes of Corallocarpus epigaeus (Cucurbitaceae) is especially useful in syphilitic cases, old venereal complaints, chronic dysentery and snake bite. Medicinal plants are resources of traditional medicines and many of the modern medicines are produced indirectly from plants. This study illustrates the folklore medicinal uses and current pharmacological profile of Vernonia anthelmintica and Corallocarpus epigaeus. This will help to learn the information related to these plants and to propose future research priorities.

Keywords: Vernonia anthelmintica, Corallocarpus epigaeus, Pharmacological activity

INTRODUCTION
Medicinal plants have been used since ancient times. According to WHO, more than 80% peoples of the world rely on herble medicine. Therefore, Assurance of the safety, quality, and efficacy of medicinal plants and herbal products has now become a key issue.

Vernonia anthelmintica (L.) Wild. (Compositae), locally named kaliziri in Pakistan, is widely used in the traditional medicine system of IndoPakistan subcontinent in mixed prescriptions as a remedy for different ailments both in humans and animals. To mention a few, the plant is used for malaria fever, worms, pain, inflammation, infections, diuresis, cancer, abortion, and various gastrointestinal disorders. It is annual herbaceous common to India and grows up to an altitude of 1500 M.

Corallocarpus epigaeus Rottl.ex.wild (Cucurbitaceae) is a prostrate or climbing monoecious plant found in tropical countries like India, Ceylon, Deccan and Peninsula region. The plant is indigenously known.
as Murdonna, Nagadonda in Telugu and Akasgaddah in Hindi. The plant is reported to contain a sesquiterpene, lactone-corallocarpenoyl ester and an aliphatic C32 keto diol. The roots and rhizomes are having many traditional claims especially in syphilitic cases, old venereal complaints, and chronic dysentery. It is also an effective remedy for diabetes, herpes, and anthelmintic, rheumatism and snake bite. Decoction of root has given benefit in cases of chronic mucous enteritis.

It may be suggested that further research on a large scale level with a large number of animals on higher doses than those used in the reported study; for the identification of active principles; and for standardization of the doses and toxicity studies for drug development. Therefore, this review is aimed at opening up new vistas in realizing the therapeutic potential of Vernonia anthelmintica and Corallocarpus epigaeus in treatment of various diseases.

**Reported pharmacological activity of Vernonia anthelmintica (L.) Wild.**

V. anthelmintica [syn. Centhraterum anthelminticum (L.) Kuntze], native to Africa and Asia, has been studied to treat diabetes and helminth infections.

Antibacterial and antifungal activities evaluated on methanolic extracts of Thuja occidentalis, Vernonia anthelmintica, Dryopteris chrysocoma and Trachyspermum ammi. Extracts were tested in vitro for their antibacterial and antifungal activities. Antibacterial study performed against six bacteria viz., Escherichia coli, Citrobacter, Shigella flexenari, Yersinia aldovae, Staphylococcus aureus and Pseudomonas aeruginosa indicated that has potent activity against all microorganisms. The antifungal activity of these extracts was performed against six fungi, viz., Saccharomyces cereviciae, Aspergillus parasiticus, Trichophyton rubrum, Macrophomina, Fusarium solani and Candida albicans. The extracts showed significant results against different fungal strains.

Thirty four medicinal plants, belonging to twenty eight different families, screened for potential antibacterial activity against six bacterial strains belonging to Enterobacteriaceae, viz. Enterobacter aerogenes, Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, Proteus vulgaris, Salmonella typhimurium. Antibacterial activity of aqueous and alcoholic extracts was tested by the agar disc diffusion and agar well diffusion methods. The ethanol/methanol extracts were more active than aqueous extracts for all the plants studied. The most susceptible bacterium was K. pneumoniae, while the most resistant bacteria were S. typhimurium and E. coli. This plant may be used further to isolate and evaluate the therapeutic antimicrobials.

Anti-inflammatory activity and anti-arthritic activity of ethanolic extract of seeds of Vernonia anthelmintica (EVA) evaluated in different experimental paradigms. The seeds were extracted by soxhlet method using ethanol (99.9%) and subjected to the preliminary phytochemical and acute toxicity studies. The effect of EVA was evaluated for acute inflammation in carrageenan induced rat paw edema and
xylene induced ear edema in mice and for chronic inflammation in complete Freud’s adjuvant (CFA) induced arthritis in rats. Further, the biochemical, histopathological and radiographic evaluation was performed. Additionally, ulcerogenic potential of EVA in rats was evaluated. The phytochemical evaluation revealed the presence of alkaloids, flavonoids, steroids, triterpenes and polyphenols in EVA. In acute toxicity test, no signs of toxicity and mortality were observed on oral administration of EVA in mice up to a dose of 5000 mg/kg. In acute study, pretreatment with EVA (250, 500 & 750 mg/kg, p o) was significantly inhibited the carrageenan induced rat paw edema and xylene-induced ear edema in mice. In chronic study decreased paw volume and paw thickness; increased liver weight and decreased spleen weight; decreased serum SGOT and increased serum TP level and inhibition of histopathological changes and soft tissue swelling destruction of the knee joints in radiographic examination were evident after treatment with EVA (250 & 500 mg/kg, p o). Further, in the animals treated with EVA (500 mg/kg, p o) ulceration was not evident. The results of present study were revealed the effectiveness of EVA in acute as well as chronic inflammatory conditions without ulcerogenic potential. The EVA may possibly act by preventing production of nitric oxide from nitric oxide synthase or by preventing neutrophilic infiltration thereby decreasing the generation or release of chemotactic factors and inflammatory T cell mediators such as IL, TNF-á and LTs. These effects may be attributed to phytochemicals present in EVA\textsuperscript{21}.

Ethanolic extract prepared from the seeds of \textit{Vernonia anthelmintica} evaluated for its anti hyperglycemic activity in STZ (Streptozotocin) induced diabetic rats. Administration of ethanolic extract at a dosage of 0.50 g/kg b w produced the maximum fall (82%) in the blood glucose levels in diabetic rats after 6 h of treatment. Bioassay directed fractionation using silica gel column chromatography was performed. Among the five fractions (A1, B1, C1, A2 and B2) obtained, of an initial chromatographic separation of the ethanolic extract, fraction A2 (100 mg/kg b.w.) showed the maximum anti hyperglycemic activity which is significantly higher than that of the reference drug glibenclamide (20 mg/kg b.w.). Administration of the active fraction (100 mg/kg b.w.) for 45 days resulted in significant reduction in plasma glucose, HbA1C, cholesterol, triglycerides, LDL, VLDL, free fatty acids, phospholipids and HMG-CoA reductase in STZ diabetic rats. In addition to that, significant decrease in plasma insulin, protein, HDL and hepatic glycogen observed in STZ diabetic rats, was normalized after 45 days of treatment with the active fraction of \textit{V. anthelmintica} seeds. From the present study, it is evident that, the seeds of \textit{V. anthelmintica} possess significant antidiabetic and anti-hyperlipidemic property without evident toxic effects\textsuperscript{22}.

Analgesic and antipyretic activities of petroleum ether and alcohol extracts of \textit{Centratherum anthelminticum} (L) Kuntze ( Asteraceae ) seeds (100 and 200 mg/kg, p. o.) evaluated in brewer's yeast

induced fever model in rats, acetic acid-induced writhing and Eddy's hot plate methods in mice. Both petroleum ether and alcohol extracts showed significant decrease in number of writhes in acetic acid-induced writhing and increase in paw licking time to heat stimuli in the hot plate method. The maximum analgesic activity was observed at 90 min after dosing when compared to control. Both the extracts showed significant inhibition of elevated body temperature when compared to corresponding control. These results suggested that the petroleum ether and alcohol extracts possessed analgesic and antipyretic activities.

Crude extracts of fruits and leaves of *Centratherum anthelminticum* in different solvents were tested for larvicidal activity against *Anopheles stephensi*, the vector of malaria. The petroleum ether crude extract of both fruits and leaves exhibited significant larvicidal activity against III instars larvae with LC$_{50}$ values of 162.60 ppm and 522.94 ppm, respectively after 24 hr. The petroleum ether extract of fruit was 11.66, 2.15 and 1.32 times more toxic than that of leaf extract after 24, 48 and 72 hr, respectively at LC$_{90}$ level. However, at LC$_{50}$ level the corresponding values were 3.22, 1.83 and 1.19, respectively. The petroleum ether extract of *C. anthelminticum* fruits is a promising source for the control of *Anopheles larvae*.

**Reported pharmacological activity of *Corallocarpus epigaeus* Rottl.ex.wild**

The antivenom activity of medicinal plants could be considered as an effective alternative to produce mammalian antibody for the treatment of snake bite envenomation. Meenatchisundaram *et al.* (2008) evaluated antivenom properties of the Indian medicinal plants in the management of poisonous snake bites. The usage of natural medicine identified from plants and herbs has been influenced by inadequacy of biomedical health system and due to its cultural acceptability and cost effectiveness. In folk medicine, many vegetal species are employed for the treatment of snake bites in communities that lack prompt access to serum therapy especially in developing countries. Active compounds of higher plants and herbs have great impact on treatment and management of poisonous snake bite.

The ethanolic extracts of *C. epigaeus* can neutralized the venom effect to some extent by depleting the extent of envenomated rat tissue MDA levels and reduced the extract of envenomated rat tissue / cellular injury by lipid peroxides. Usually antioxidants are known well to reduce the formation of excess MDA and whether the plants ethanolic extracts possess antioxidant properties or not is not known due to lack of adequate experimental data to the present.

Dhanapal (2006) has reported antisteroidogenic activity of the ethanol extract of *C. epigaeus* tubers in female mice ovaries that showed positive response.

Immunomodulatory properties on venom neutralizing activity of crude root extract of *C. epigaeus* were determined by *in vivo* procedure. Neutralization assays for antivenom is necessary to replace the *in vitro* neutralization assay. Albino mice were used to estimate venom neutralizing activity of tuber extract.
epigaues tuber extract preparations exhibit immunomodulatory properties. This extract strongly induces the proliferation peripheral blood mononuclear cells. The stimulatory potency of tuber extract for peripheral blood mononuclear cells, from two different groups were examined. The findings indicated that a mitogen associated antigen from C. epigaues tuber extract was able to activate peripheral blood mononuclear cells from healthy and allergic individuals, thereby demonstrating sensitization to probably highly conserved plant antigens 29.

Antifungal activity in petroleum ether, hexane, chloroform, acetone and methanol extracts of leaf, stem and tuber of C. epigaues against Candida albicans, C. tropicalis, Aspergillus niger, A. flavus and A. versicolor by disc diffusion method was investigated. Methanol extract of C. epigaues tuber exhibited maximum activity against most of the tested fungi. The petroleum ether and hexane extracts obtained from C. epigaues stem was found to be active only against A. niger, A. flavus and A. versicolor. All the crude extracts exhibited activity against A. niger and A. flavus. The tuber extract of C. epigaues showed higher inhibitory effect than leaf and stem.

Anthelminthic activity of C. epigaues plant decoction of root powder was investigated and it has benefited in cases of chronic mucous enteritis and also used as anthelminthic. The anthelminthic activity of the alcoholic and aqueous extracts of roots and rhizomes of C. epigaues was evaluated on adult earthworms Lampito marutii, Eudrillus eugine, Eisenla foetida using piperazine citrate as the reference standard. The extracts caused paralysis followed by death of the worms at all tested dose levels 31.

Anti-diabetic activity on C. epigaues rhizome extract at two dose levels in both normoglycaemic and hyperglycemic rats was evaluated. The plant extract at its high dose group that is 400 mg/kg has been significantly inhibited the elevation of the blood glucose levels in the animals 32.

The safety and efficacy profile of 85% methanolic extract of C. epigaues (CE) was evaluated. In safety profile LD50 value was determined by carrying out an acute toxicity study. In efficacy profile, the analgesic activity was evaluated by both hot plate and tail immersion tests. The anti-inflammatory activity was assessed by carrageenan-induced paw edema and antiarthritic effect by complete Freund's adjuvant induced arthritis. Phytochemical screening of different C. epigaues extracts and quantitative analysis of both raw herb and 85% methanolic extract also had been carried out. The methanolic extract displayed analgesic activity by increasing the response time in both hot plate and tail immersion method. Extract exhibited 23% of anti-inflammatory activity and 33% of anti-arthritic effect in complete Freund's adjuvant induced paw edema. The C. epigaues extract increased the antioxidant level, along with a decrease of the oxidative stress developed by complete Freund's adjuvant induced arthritis. Thus, the study concluded that C. epigaues is a rich source of phytochemicals with analgesic, anti-inflammatory and antioxidant activities 33.
Conclusion

According to World Health Organization (WHO) the majority of the populations of the world still relying on traditional medicine for meeting every day health care needs. Consumers have reported positive attitudes towards these products, in large part because they believe them to be of natural rather than synthetic origin, they believe that such products are likely to be more safe than synthetic drugs, they are considered part of a healthy life style, and they can help to avoid unnecessary contact with conventional western medicine. On the basis of results from reported pharmacological studies, *Vernonia anthelmintica* and *Corallocarpus epigaeus* may be useful for human health associated emerging diseases such as cardiovascular diseases, diabetes, hypertension and cancer and holds the most promise for development of new potent herbal drugs.

References


