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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 folkare 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[1].

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 [2-10]. It is annual herbaceous common to India and grows up to an altitude of 1500 M [11].

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 Murdonda, Nagadonda in Telugu and Akasgaddah in Hindi [12]. The plant is reported to contain a sesquiterpene, lactone-corallocarpenoyl ester and an aliphatic C32 keto diol [12]. The roots and rhizomes are having many traditional claims especially in syphilitic cases, old venereal complaints, and chronic dysentery [13]. It is also an effective remedy for diabetes [14], herpes, and anthelmintic [15], rheumatism and snake bite [16]. Decoction of root has given benefit in cases of chronic mucous enteritis [15].

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 [11, 17] and helminth infections [18].

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 [19].

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 [20].

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[21].

Ethanolic extract prepared from the seeds of *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 *V. anthelmintica* seeds. From the present study, it is evident that, the seeds of *V. anthelmintica* possess significant antidiabetic and anti-hyperlipidemic property without evident toxic effects [22].

Analgesic and antipyretic activities of petroleum ether and alcohol extracts of *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 [23].

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* [24].

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) [25] 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 [26].

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 antioxidatant properties or not is not known due to lack of adequate experimental data to the present [27].

Dhanapal (2006) has reported antisteroidogenic activity of the ethanol extract of *C. epigaeus* tubers in female mice ovaries that showed positive response [28].

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. *C.*

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. epigaeus* against *Candida albicans*, *C. tropicalis*, *Aspergillus niger*, *A. flavus* and *A. versicolor* by disc diffusion method was investigated. Methanol extract of *C. epigaeus* tuber exhibited maximum activity against most of the tested fungi. The petroleum ether and hexane extracts obtained from *C. epigaeus* 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. epigaeus* showed higher inhibitory effect than leaf and stem.

Anthelminthic activity of *C. epigaeus* 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. epigaeus* 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. epigaeus* 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. epigaeus* (CE) was evaluated. In safety profile LD_{50} 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. epigaeus* 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. epigaeus* 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. epigaeus* 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

1. Singh R. Medicinal plants: A review. Journal of Plant Sciences. 2015; 3(1-1): 50-55.
2. Johri RK and Singh C. Medicinal uses of Vernonia species. J Med Arom Plant Sci. 1997; 19: 744–752.
3. Nadkarni AK. Indian Materia Medica. Bombay, India, Popular Prakashan. 1954.
4. Chopra RN, Nayyar SL and Chopra IC. Glossary of Indian Medicinal Plants. New Delhi, India, Council of Scientific and Industrial Research. 1956.
5. Hsu YT. Study on the Chinese drugs used as cancer remedy. J S East Asian Res 1967; 3: 63.
6. Jain SP and Puri HS. Ethnomedicinal plants of Jaunsar Bawar hills (Uttar Pradesh) India. J Ethnopharmacol. 1984; 12: 213-222.
7. Singh VK and Ali ZA. Folk medicines of Aligarh (Uttar Pradesh) Indian. Fitoterapia 1989; 60: 483-490
8. Bhattarai NK. Folk herbal medicines of Makawanpur district, Nepal. Int J Pharmacog 1991; 29: 284-295.
9. Bajpai A, Ojha JK and Sant HR. Medicobotany of the Varanasi district. Int J Pharmacog 1995; 33: 172–176.
10. Grainger CR. Medicinal plants of seychelles. J Royal Soc Health 1996; 116: 107–109.
11. Fatima SS, Rajasekhar MD, Kumar KV, Kumar MTS, Babu KR and Rao CA. Antidiabetic and anti hyperlipidemic activity of ethyl acetate: Isopropanol (1:1) fraction of *Vernonia anthelmintica* seeds in streptozotocin induced diabetic rats. Food Chem Toxicol. 2010; 48: 495–501.
12. Kirtikar KR and Basu BD. Indian Medicinal Plants (2nd ed., Volume II, pp 1664). Allahabad (India): Lalit Mohan Basu. 1996.

13. Nadkarni KM. The Indian Materia Medica (1st ed., Volume I, pp 377). Bombay: Popular Prakashan 1982.
14. Chetty KM, Shivaji K and Tulasi KR. Flowering plants of Chittoor district Andhra Pradesh, India (2nd ed., pp 138). Tirupathi: Student offset printers. 2004.
15. Ali M and Gupta J. Chemical Constituents of Corallocarpus epigaeus rhizomes. Journal of Medicinal and Aromatic plant sciences. 1996; 18(4): 791-794.
16. Chopra RN, Nayar SC and Chopra IC. Glossary of Indian Medicinal Plants (1st ed., pp 980). New Delhi: Council of scientific and industrial research. 1956.
17. Rao UM, Sreenivasulu M, Chengaiah B, Reddy KJ and Chetty CM. Herbal medicines for diabetes mellitus: A review. Int J Pharm Tech Res. 2010; 2: 1883-1892
18. Mali RG and Mehta AA. A review of anthelmintic plants. Nat Prod Radiance 2008; 7: 466-475.
19. Jahan N, Ahmad M, Mehjabeen Zia-Ul-Haq M, Alam SM and Qureshi M. Antimicrobial screening of some medicinal plants of Pakistan. Pak J Bot. 2010; 42: 4281-4284.
20. Parekh J and Chanda S. In vitro screening of antibacterial activity of aqueous and alcoholic extracts of various Indian plant species against selected pathogens from Enterobacteriaceae. Afr J Microbiolo Res. 2007; 1(6): 092-099.
21. Otari KV, Shete RV, Upasani CD, Adak VS, Bagade MYand Harpalani AN. Evaluation of anti-inflammatory and anti-arthritic activities of ethanolic extract of *Vernonia anthelmintica* seeds. J Cell Tissue Res. 2010; 10(2): 2269-228.
22. Shaik SF, Maddirala DR, Kondeti VK, Mekala TSK, Kasetti RB and Rao CA. Antidiabetic and anti-hyperlipidemic activity of ethyl acetate: Isopropanol (1:1) fraction of *Vernonia anthelmintica* seeds in streptozotocin induced diabetic rats. Food Chem Toxicol. 2010; (48): 495–501.
23. Purnima BC, Koti VP, Tikare AHM, Viswanathaswamy AHM and Thippeswamy DP. Evaluation of analgesic and antipyretic activities of *Centratherum anthelminticum* (L) Kuntze Seed A. Indian J Pharm Sci. 2009; 71(4): 461–464.
24. Srivastava A, Bartarya R, Tonk S, Srivastava SS and Maharaj KK. Larvicidal activity of an indigenous plant, Centratherum anthelminticum. J Environ Biol. 2008; 29(5) 669-72
25. Meenatchisundaram S, Parameswari G, Subbraj T and Michael A. Anti-venom Activity of Medicinal Plants - A mini review. Ethnobotanical Leaflets. 2008; 12: 1218-1220.
26. Kaushik A, Ambesajir A, Kaushik JJ and Girmay B. Snake venom neutralization effects of African medicinal plants & their impact on snakebites: A review. Asian Journal of Biomedical and Pharmaceutical Sciences. 2013; 3(24): 1-6.

27. Ponna V, Ranjani R, Rao MR and Sudarsanam G. Impact of antidote medicinal plant- *Corallocarpus epigeus* extract on lipid peroxidation induced by naja naja- snake venom in albino rat. International Journal of Medicine and Pharmaceutical Sciences. 2013; 3(5): 23-30.
28. Dhanapal R, Chandanam S, Vrushabendra Swamy BM, Ashoka Babu VI, Gupta M and Basu SK. Antisteroidogenic activity of *Corallocarpus epigaeus* Benth. ex Hook. tubers in female mice ovaries. Asian J Chem. 2006; 18 (2): 1013-1016.
29. Chandrakala AN, Reddy AH, Nageswari G, S Vani DS, Begum SS and Venkatappa B. Anti venom and immunomodulatory functions of *Corallocarpus epigaeus* L. Int J Pharm Bio Sci. 2013; 4(1): 654-660.
30. Vasantha K , Priyavardhini S , Tresina SP and Mohan VR. Antifungal activity of *Corallocarpus epigaeus* (hook. f.). Bioscience Discovery. 2012; 3(1): 87-90.
31. Kirubha TSV, Senthamarai R, Vasuki K, Rao AV and Selvadurai S. Anthelmentic activity of roots of rhizomes of *Corallocarpus epigaeus* J Nat Prod Plant Resour. 2011; 1(1): 81-84.
32. Gnananath K, Reddy KR, Kumar GP, Krishna B, Reddy KS and Kumar AS. Evaluation of antidiabetic activity in *Corallocarpus epigaeus* rhizomes. International Current Pharmaceutical Journal. 2013, 2(3): 53-56.
33. Uthrapathy S, Shabi MM, Krishnamoorthy G, Ravindhran D, Rajamanickam VG and Dubey GP. Analgesic and anti-arthritic effect of *Corallocarpus epigaeus*. Acta Bioquím Clín Latinoam. 2011; 45 (4): 749-756.