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PHARMACOLOGICAL ACTIVITIES OF CENTRATHERUM PUNCTATUM – A REVIEW

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ABSTRACT

Centratherum Punctatum plant is very well known for its therapeutics benefits in Indian systems of medicine including Ayurveda and Siddha and in other forms of traditional medicine worldwide for the treatment of several ailments. It observed that many traditional utilities of got their authentication when tested using different disease-based pharmacological models taking various extracts of roots, leaves, and root oil as test samples. Our review article focusses to pharmacological activites are anti-oxidant, anthelmintic, anti-cancer, anti-inflammatory, laravicidal activity, protease activity, prolifretive activity, anti-fungal, cytotoxicity, antiplasmodial, antimicrobial, HIV-1 reverse transcriptase inhibitory, synergistic activity, wound healing property. This article can give potential research areas to explore next, and to formulate new formulation in allopathy and some traditional medicine system.

KEYWORDS: "Anticancer", "Antifungal", "Anthelmintic"**, "**Centratherum punctatum", "Kesavardhini", "larvicidal activity".

INTRODUCTION

The native distribution range of C. punctatum is very ambiguous. Depending on the authors this species is considered native to Central and South America, but also to the Philippines and Australia (Kirkman, 1981; Davidse et al., 2009; USDA-ARS, 2013). Recent reviews and checklists have it as naturalized in Asia, Africa, Madeira, the West Indies, and islands in the Pacific Ocean (Flann, 2009; see also distribution table for details). C. punctatum grows

mostly in tropical areas from sea level up to 1200 m asl. It behaves as a weed both outside and inside its native distribution range, where can be very common in disturbed areas, forest edges, and along roadsides (PIER, 2013). In Panama, this species has been described as locally common in rocky or gravelly savanna-like areas (Woodson and Schery, 1975; Tropicos, 2013). In Australia it is described as a weed of disturbed places from 400-740 masl and can be found on the edges of vine forest and rainforest and in some drier types of open forest and woodland (CSIRO, 2010). In Hawaii, it can be found growing in areas with sunny and dry conditions (Staples and Herbst, 2005; PIER, 2013).[1]

PHARMACOLOGICAL ACTIVITIES

1. Anti-Inflammatory activity

Krithika et.al., describe about the Centratherum punctatum Cass., a herb belonging to the family Asteraceae has been traditionally used as a curative against diverse disorders like inflammation, tumor, depression, and hypertension. Though the medicinal properties of this plant have been attributed to the presence of flavonoids, glucosides, alkaloids, Vitamin C, etc., the molecular constituents of this plant and of the flavonoids that contribute to its medicinal activity have not been explored yet. This work attempts to evaluate the potential of Centratherum punctatum extract as an anti-inflammatory agent. Ethanolic extracts of Centratherum punctatum analyzed by High Performance Thin Layer Chromatography (HPTLC) and Liquid Chromatography–Mass Spectrometry (LC–MS/MS) identified the presence of the flavones kaempferol, glycoside Isorhamnetin-3-O-rutinoside, and kaempferol-3-glucoside. The plant extract exhibited anti-oxidant property as confirmed by DPPH assay and IC50 value of 271.6 µg/mL during inhibition of protein denaturation, 186.8 µg/mL during RBC membrane stabilization, and 278.2 µg/mL for proteinase inhibition. Membrane stabilizing functions of flavones and flavones glycosides validated the anti-inflammatory potential of the extract. In silico evaluation using a rigorous molecular docking protocol with receptors of Cox2, TNF-α, Interleukin 1β convertase, and Histamine H1 predicted high binding affinity of the isoflavones and isoflavone glycosides of Centratherum punctatum Cass. The interactions have also been shown to compare well with that of known drugs valdecoxib through Gln178, His342, and Gly340, desloratadine (through Lys191 and Thr194) and belnacasin (through Asp288 and Gly287) proven to function through the anti-inflammatory pathway. This work establishes the anti-inflammatory potential of Centratherum punctatum Cass. Extract as an alternative to existing therapeutic approach to inflammation through a systematic in silico approach supplementing the findings.[2]

2.Antiplasmodial, HIV-1 reverse transcriptase inhibitory, Cytotoxicity activity:

Chukwujekwua et.al.,describe about the hexane, dichloromethane, ethyl acetate and aqueous fractions of an ethanolic extract of Centratherum punctatum leaves were screened for antiplasmodial, HIV-1 reverse transcriptase inhibitory and cytotoxicity properties. The crude extract exhibited both antiplasmodial (IC50 = 3.2 µg/ml) and HIV-1 reverse transcriptase inhibitory (IC50 = 72.8 µg/ml) activities. A remarkable improvement in both antiplasmodial (IC50 = 0.419 µg/ml) and HIV-1 reverse transcriptase inhibitory (IC50 = 52.4 µg/ml) activities was observed with dichloromethane fraction. The study revealed the antiplasmodial and HIV-1 RT inhibitory effects of C. punctatum and its fractions, especially the dichloromethane fraction. However, its safety index values [antiplasmodial (0.2), HIV-1 reverse transcriptase inhibition (0.0017)] indicate that the fraction is cytotoxic.[3]

3. Protease activity, Wound healing property

Chitra et.al., describe about the Flowers of Centratherum punctatum Cass, are used in traditional medicine for quick wound healing. Protease, a potential aspirant in wound healing is not so for studied in C. punctatum Cass flowers. So an attempt was made to resolve the protease activity of floral extracts of C. punctatum Cass. Buffers of different pH range were used for extraction of the flowers to identify the best buffer for extraction of protease. Total protein content and protease activity were determined in the floral extracts. Floral extract showed higher protease activity when the extraction was carried out at pH 4.0. The results of the present study indicate that protease activity of the flower may be responsible for wound healing property of the flowers of C. punctatum.[4]

4. Anthelmintic Activity

Maggalí Gonzalez et.al., describe about the chromatographic profile of the methanolic extract of Centratherum punctatum Cass. was determined by LC-MS. Also, the anthelmintic activity of the extract and its fractions was assayed against Eisenia fetida. Ultrasound-assisted maceration with methanol as solvent was used to obtain the crude extract. The extract was submitted to liquid–liquid partition with solvents (hexane, chloroform, ethyl acetate, and water) for the obtention of the fractions. The crude extract and the fractions were assayed for anthelmintic activity using E. fetida as a model, being albendazole the positive control. Hydroxycinnamic acid derivatives, flavonoids, and sesquiterpene lactones were identified by LC-MS. The methanolic extract and the fractions showed a significant decrease in the times of paralysis and death compared to albendazole. These results suggest that the methanolic

extract of C. punctatum and its fractions contain substances with potential anthelmintic activity. The plant could be a source of molecules useful for the development of new anthelmintic drugs.[5]

5. Synergistic Activity

Chukwujekwu et.al., describe about the Three known sesquiterpene lactones were isolated from Centratherum punctatum leaf extract. Their antibacterial properties and synergistic effects with ampicillin against drug-resistant Gram-negative bacteria were studied. Individually, they exerted little or no antibacterial activity against the bacterial strains. However, when combined with ampicillin, centratherin showed synergistic interaction against both bacterial strains. Centratherin reduced the MIC of ampicillin sixteen-fold. It portrayed potentiating effects when combined with the antibiotics.[6]

6. Anticancer Activity

Sivasubramanian et. al., describe about the Nutraceuticals play a major role in health enhancement by contributing in preventing and managing diseased conditions. The global market size of Nutraceuticals is expected between 30 and 60 billion US$, with Japan, US, and Europe occupying the biggest share. By 2015, the Nutraceutical demand is forecasted to touch $201 billion. There is an increased global interest due to the recognition that Nutraceutical have been claimed to encompass a physiological betterment or offer defense against certain ailments. For example Flavonoids in onion and black grape can act as protective agents against cardiac diseases. Similarly bittermelon and cinnamomum extracts can be good supplements in diabetic conditions and Resveratol from berry fruits can help patient suffering from inflammatory diseases. In the present work with a view to develop a healthy herbal supplement for Cancer patients the nutraceutical potentials of an anticancerous traditional drug source Centratherum punctatum Cass. belonging to the family Asteraceae is evaluated employing sophisticated instrumentation and analytical tools. The data of the results obtained revealed presence of Carbohydrates, Proteins, Vitamins and minerals such as Zinc, Magnesium and Iron. Flavones and Phenols were other important secondary metabolites detected in the plant source. These nutraceutical elements identified could be useful especially for Cancer patients in improving their immunity and altering the weakened hemopoietic profiles. Further in depth studies can significantly contribute in developing a safe and efficacious herbal supplement from this plant source for the better healthcare of human society particularly for people suffering from cancer.[7]

7. Larvicidal Activity

Nityasree et.al., describe about the Insect transmitted diseases remain a major cause of illness and death worldwide. Mosquitoes areresponsible for spreading serious human diseases such as chikungunya, dengue, yellow fever, malaria, Japanese encephalitisand filariasis. Aedes aegypti and Aedes albopictus (Culicide), are two main species of mosquitoes. The control of mosquitoworldwide depends primarily on organophosphates and other Synthetic chemicals. The majority of commercial repellent products contain the chemical DEET (diethyl-3-methylbenzamide), DEET is not the ideal product, as allergic and toxic effectshave been documented (Teach, 2007) Because of the undesirable effects of DEET, research was actively carried out to find analternative compound that is safer to use and equally or more effective (Gleiseret al., 2011). The use of herbal products isone of the better alternatives for mosquito control.[8]

8.Antifungal activity

Saranya et.al.,describe about the Many anti-fungal shampoos, whether synthetic or herbal, are commercially marketed all over the world. The present study deals with the efficacy of different herbal extracts, shampoos and oils on dandruff causing fungus isolate Malassezia. Isolation of Malassezia was carried out by using sabouraud dextrose agar (SDA). Different herbal extracts of Phyla nodiflora, Carcia papaya, Centratherum punctatum, Indigoflora tinetora, Capsicum frutescens, Moringa oleifera,commercial shampoos and oils were taken to test the effectivity against Malassezia using adar cup method. Dilution of samples at different concentrations 5%, 15%, 25%, 50% and 75% (v/v) and Minimum Inhibitory Concentrration (MIC) method was performed. In agar cup method, Zone of Inhibition formed in Centratherumpunctatum, Phyla nodiflora, Shampoos A and B. In MIC method, Zone of Inhibition formed in Centratherum punctatumat 75%, 50%, 25%,15%and 5%, Phyla nodiflora at 75% and Shampoo B at 75%, 50% and 25%. Herbal extracts proved to be more effective compared to synthetic shampoo and oil as the herbal extracts have lesser adverse effects than the latter. The highest Zone of Inhibition was obtained in Centratherum punctatum extract.[9]

9. Antimicrobial,Antioxidant& Anti proliferative activity

Centratherum punctatum, the Brazilian button flower, is very closely related to its counterpart C. anthelmethicum - a plant known for its high medicinal value. To validate if C. punctatum would also be of any such value, the leaf extract of the plant was evaluated for anti-microbial, antioxidant, human cell toxicity properties and analyzed for the presence of phytochemical

constituents. Powdered leaf of the plant was extracted with different organic solvents and tested for anti-microbial activity by the agar well-diffusion method. The antioxidant activity was analyzed by Ascorbic acid method. The toxicity of the extract was tested by the MTT assay using human peripheral blood mononuclear cells (PBMCs). Extracts were then subjected to bioautography and the phyto-chemical constituents isolated and tested for antimicrobial activity. TLC fractions that tested positive for anti-microbial activity were partially characterized for functional group identification by KBr method using Fourier Transform Infrared Spectroscopy. Acetone, methanol and ethyl acetate extracts of leaf showed inhibitory activity against four out of five pathogenic bacteria including the multi drug resistant (MDR) Acinetobacter baumanii and Staphylococcus aureus tested. Anti-fungal activity was exhibited by acetone and ethyl acetate extracts. Phytochemical analyses revealed the presence of flavonoids, tannins and cardiac glycosides, of which flavonoids showed antibacterial activity. The IC50 value for the acetone extract was found to be 10.63 Î¼g/ml. FTIR analysis revealed the presence of alkene, alkane, aliphatic amine and aromatic functional groups among others. We conclude that the present study adds credence to the ethno-medicinal properties of C. punctatum. Further characterization of phytochemical compounds from this prolific herb may yield potential antimicrobial agents.[10]

CONCLUSION

This review paper shows all the activities of Centratherum punctatum and the pharmacological activities like anti-cancer, anti-microbial, etc. Extract of Centratherum punctatum leaves ,flowers,root,contains more bioactive principles, which act against the representative human pathogens. Moreover, this reviewed article showed more pharmacological applications and helps to developing the allopathy and traditional formulations.

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