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## POTENTIAL BENEFITS OF *CYPERUS ROTUNDUS* IN MANAGEMENT OF NEURAL MANIFESTATIONS

CHAKRABORTHY G<sup>1\*</sup> AND HAZRA S<sup>2</sup>

1: Principal and Professor, Parul Institute of Pharmacy & Research, Parul University,  
Vadodara, Gujarat, India, 391760

2: P G Scholar, Department of Pharmacology, Parul Institute of Pharmacy & Research,  
Parul University, Vadodara, Gujarat, India, 391760

\*Corresponding Author: Dr. GunoSindhu Chakraborty: E Mail: [g.chakraborty19159@paruluniversity.ac.in](mailto:g.chakraborty19159@paruluniversity.ac.in)

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### ABSTRACT

Plants serves as a natural habitat to many of the organism as they are dependent on it. Some of them act as nutrients, protective, therapeutic agents. One of the plant is *Cyperus rotundus* Linn is a rational plant with numerous benefits in health system. It is used as diuretic, astringent, analgesic, antispasmodic, aromatic, carminative, sedative, vermifuge, stimulant, antibacterial, stomachic and litholytic. The active constitutes which are physiological active are responsible for therapeutic effects are cyprotene, cyperene, isocyperol, aselinene, rotundene, cypera-2, 4-diene, valencene, trans-calamenene, cadalene,  $\delta$ -cadinene,  $\gamma$ -calacorene, mustakone, epi- $\alpha$ -muurolene,  $\gamma$ -muurolene, nootkatene, cyperotundone, cyperol and  $\alpha$ -cyperone. This information embedded in the article will be an insight to explore the medicinal properties along with pharmacological uses and their mode of action in human which will exert a potential benefit.

**Keywords:** *Cyperus rotundus*, active constituents, pathophysiology, neural networking

### 1. INTRODUCTION

*Cyperus rotundus* Linn of Cyperaceae family is a perennial plant commonly called as coco grass native to Africa. The plant

contains tubers that are 1-3 cm tall and scaly, slender spreading rhizomes that emerge singly from the bulbous bases. With

a characteristic odour and black tint to reddish white in colour is seen. The linear, dark green leaves have grooves on the upper surface and stems that are around 25 cm tall. A few tiny blooms with a reddish-brown husk and 2-4 bracts are formed in small inflorescences. The nut is triangular, yellow in colour, oblong-ovate, and when ripe, turns black [1]. *Cyperus rotundus* can be found growing in cultivated fields, farmland, abandoned areas, grasslands, and wastelands [2]. Finds better in growth with damp to humus by proper irrigation techniques. It grows slowly, blossoms less, and produces fewer tubers in cool or wet soils [3].

## 2. GEOGRAPHICAL PATTERN

*Cyperus rotundus* also considered as weed and widely distributed in waste lands ensuring its productivity. Forms its survival in harsh conditions. Its ability to reproduce and survive in harsh environments is ensured by the basal bulbs, complex underground network of tubers, rhizomes and roots. The existence of plant becomes a threat to other as they can conquer the climatic conditions [4]. It is widely distributed in Eastern Asia (India, China, Japan, Taiwan, Korea, Myanmar, Nepal, Sri Lanka & Pakistan), Western Asia (Iraq, Afghanistan, Turkey, Syria, Yemen, Iran, Lebanon, Palestine & Saudi Arabia), Middle Asia (Uzbekistan, Kazakhstan, Turkmenistan, Kyrgyzstan), Caucasus

(Armenia, Russian Federation & Azerbaijan), Western Indian Ocean (Comoros, Seychelles, Madagascar, Reunion & Mauritius), Africa (Swaziland, Algeria, South Africa parts of the country [5].

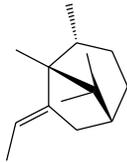
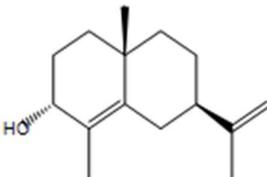
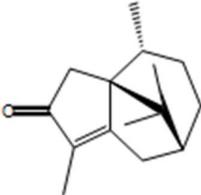
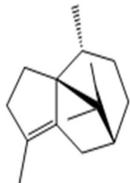
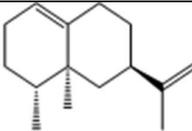
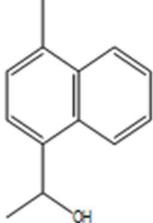
## 3. PHYTOCHEMISTRY

The active parts present in *Cyperus rotundus* belongs to the class of flavonoids, terpenes mono- and sesquiterpenes, essential oils, terpenoids [6, 7]. Few active constituents along with their chemical structures are mentioned below which are obtained from this plant.

## 4. FOLKLORE USES OF *CYPERUS ROTUNDUS*

*Cyperus rotundus* was used traditionally for vomiting, stomach disorders, gastrointestinal spasms, indigestion, irritation of bowel and food poisoning. It has also been used for treating wounds, fevers, cervical cancer, malaria, bronchitis, infertility, cough, urinary tenesmus, dysmenorrhoea, insect bites, amenorrhoea, loss of memory, deficient lactation, dysuria, menstrual disorders [8-12]. Ayurveda claims that rhizomes of *Cyperus rotundus* are considered sedative, diaphoretic, antispasmodic, astringent, aromatic, antitussive, litholytic, carminative, analgesic, emmenagogue, vermifuge, stimulant, diuretic, antibacterial and stomachic [13].

Table 1: Chemical Constituents and Their Structures

S. No.	Chemical constituents	Structures
1.	Cyprotene	
2.	Cyperol	
3.	Cyperotundone	
4.	Cyperene	
5.	Valencene	
6.	Cadalene	

## 5. PATHOPHYSIOLOGY OF NEURAL MANIFESTATIONS

### Alzheimer's disease

Alzheimer's disease (AD) often causes cognitive and behavioural deficits as well as a progressive and severe memory loss [14]. The main pathogenesis-related variables for

AD are genetic,  $\beta$ -amyloid, and acetylcholine depletion [15]. A prominent neuropathological characteristic of Alzheimer's disease is cholinergic deficiency finds its association with memory loss along with cognitive dysfunction [16].

The main enzyme responsible for breaking down acetylcholine is acetylcholinesterase (AChE) [17, 18].

Rhizomes of the plant are potent inhibitors of acetylcholinesterase [19]. Previous studies have linked Alzheimer's disease to inflammatory processes. Inflammation is brought on by reactive oxidative species (ROS), which have the power to harm cellular components and function as secondary messengers. In the treatment of AD, antioxidant usage may be beneficial [20]. The roots of *Cyperus rotundus* showed significant results in A $\beta$  rat models for the neurodisease as well as an increase in the mitochondrial distribution in Subgranular Zone of rats dentate gyrus [21]. The rhizomes were also studied for the memory enhancing activity after induction of streptozotocin and also to evaluate the cognitive dysfunction in Alzheimer Disease [22, 23].

#### **Parkinson's disease**

In case of Parkinson's disease it has been observed that protein changes plays a vital role in the pathophysiology of the disease as they tend to produce oxidative stress which leads to the rupturisation of the cells [24]. The Dopaminergic nuclei present in midbrain is found mainly the responsible function leading to substantia nigra (SN) and ventral tegmental area (VTA). This in turn results in death of neurons present in the forebrain regions [25]. *Cyperus rotundus*

decreases calcium overloading and inhibits mitochondrial dysfunction which provides neuroprotection [26].

#### **Epilepsy**

A condition which is seen due to sudden and excessive neural discharge from an uncontrolled depolarization of the neural membrane. Impaired mechanisms that control this transmission, such as the harmony between inhibitory ( $\gamma$ -aminobutyric acid, GABA) and excitatory (glutamic and aspartic acid) neurotransmitters, cause the seizure to spread [27]. Genetic susceptibility, head injuries, various metabolic disorders and neurodegenerative diseases can cause epilepsy [28]. *Cyperus rotundus* provides neuroprotection in epilepsy via decreasing glutamate and increasing GABA neurotransmitter levels [29].

#### **Depression**

It is mainly responsible for decrease in serotonin, norepinephrine, and/or dopamine levels in the central nervous system. The enzyme which helps in the production of neurotransmitters are from Noradrenaline, dopamine, and 5-hydroxytryptamine [30]. Monoamine oxidase enzyme is of two types A and B. A is more potent than B as they are involved in the treatment depression are also the potency is more with respect to its metabolism [31]. The plant according to traditional uses can be used in the treatment

of the disease, which can serve a boon to the patients [32].

## 6. EFFECTS OF *CYPERUS ROTUNDUS* AT CELLULAR LEVELS

### Cellular Levels

The grouping of all the manifestations is seen with reactive oxygen species, inflammation, and development of atherosclerosis. These reactive oxygen species acts as reducing agents in the cellular levels and blocks the process of pathological metabolism. The decreased levels of glutathione, antioxidant enzymes, and mitochondrial dysfunction leads to hyperactivity of the oxidation process and hence thereby initiates the process of destruction. The essential oil obtained from the plant part of *Cyperus rotundus* serves as a strong antioxidant and its effects are largely potentiated as because they reduce the oxidative molecules and enzymes associated with it [32, 33].

### Effect on neurotransmitter levels

Neurotransmitters are chemical messengers, which passes the messages from one part to another part by signal transduction. They pass their signals from one neuron to another and finally to the target points [34]. Around 35 to 40 neurotransmitters are located in the nervous system of human found which are responsible for many actions and mechanisms [35]. Any disturbance in the neurotransmitters can lead to acute to fatal

conditions in the human body and which in turn can be dangerous for its recovery [36].

### Neuronal inflammation

Neuroinflammation is the medical term for an inflammatory reaction that occurs in the brain or spinal cord. Inflammation is generally mediated by the chemical compounds which are synthesized inside our body like chemokines, cytokines, secondary messengers and reactive oxygen species. They are the products of CNS glia (microglia and astrocytes), which are peripherally derived immune cells and endothelial cells. These are having responses like immunological, biochemical, psychological and physiological effects. Studies from researches have shown a significant result in the treatment regime of inflammatory mediators [37].

### Other therapeutic action

*Cyperus rotundus* also possess anti-pyretic [38], anti-emetic, spasmolytic [39], anti-diarrhoeal [1], anti-hyperlipidaemic [40], hepatoprotective [41], antidiabetic activity [42, 43]. Anti-dysmenorrhoea effect [44] and also used in cerebral ischemia [45] and peptic ulcers [46].

## 7. CONCLUSION

Traditional uses of plant-based products are extensively in to use due to its minimal side effects and potent therapeutic effects. An extensive literature reveals the potency of the plant and its parts, which can be explored for better therapeutic activity, and the

molecules associated with it. This plant possesses significant neuroprotective properties, making a thrust for its treatment. Hence, the flora can be explored a lot in these areas which will be beneficial to human race. Nowadays a lot stress is involved and due to which are neurons are stretched to its maximum leading to various diseases. Hence a herb which can clam and control these neurons can be used as a potent relaxant.

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