



Current Research in Pharmaceutical Sciences

Available online at www.crpsonline.com



ISSN: 2250 – 2688

Received: 04/03/2017

Revised: 16/03/2017

Accepted: 29/03/2017

**Muneesh Kumar, Manisha Rani,
Bibekananda Meher**
Faculty of Pharmacy,
IFTM University Moradabad,
Uttar Pradesh-244102, India.

Correspondence

Bibekananda Meher
Faculty of Pharmacy,
IFTM University Moradabad,
Uttar Pradesh-244102, India

E mail: meherbibek@gmail.com

DOI: 10.24092/CRPS.2017.070102

Website: www.crpsonline.com

Quick Response Code:



Review on Pharmacology and Phytochemistry of *Cyperus rotundus* L.

Muneesh Kumar, Manisha Rani, Bibekananda Meher

ABSTRACT

Nowadays there is increasing interest of researchers to explore herbal drugs for health benefits of human as well as animals. Drugs which are obtained from natural sources are pharmacologically potent and have low or no side effects for use in preventive medicine. *Cyperus rotundus* L. is commonly known as nagarmotha, motha in local languages. It is available all over the country. *Cyperus rotundus* is having some reported activities like antidiabetic, hypolipidemic, hepatoprotective and antimicrobial properties. It contains flavonoids, tannins, glycosides, monoterpenes, sesquiterpenes, sitosterol, alkaloids saponins, terpenoids, essential oils, starch, carbohydrates, protein, separated amino acids and different secondary metabolites. Considering the growing interest in the field of plant drugs assessing different pharmacological activities. In this review we are discussing about the therapeutic potential and chemical constituents of *Cyperus rotundus*.

Key Words: *Cyperus rotundus*, flavonoids, tannins, antidiabetic, hypolipidemic.

1. INTRODUCTION

Most of the people all over the world use plant drugs for treatment of different diseases. It always plays a key role in the treatment of different ailment of human and animals all over the world. In developing country more researchers are working on plant and plant product so recognition of natural product is growing. Herbal drugs play a major role in both traditional and modern system of medicine.¹ Nagarmotha (*Cyperus rotundus*) (figure 1 and 2) commonly known as Nagarmotha is found throughout India. It belongs to the family Cyperaceae. The genus name *Cyperus* is derived from *Cypeiros*, which was the ancient Greek name for the genus, *rotundus* is Latin word for round and refers to the tuber.²

Cyperus rotundus is commonly known as Nagarmotha belonging to (family-*Cyperaceae*) is widely used in traditional medicine around the world for the treatment of various diseases. This plant is also known as Purple nutsedge or nutgrass, motha, musta and are used in anti-inflammatory, antidiabetic, antidiarrhoeal and antipyretic.³ Roots are useful for developing memory. It also shows protective action on liver, spleen, and pancreas. It also possess different Pharmacological actions like anthelmintic, anti-fungal, anti-parasitic, anti-rheumatic, antispasmodic, aphrodisiac and astringent.⁴ Traditional practitioner used this plant from thousands of years especially in Chinese traditional medicine. All parts of the *Cyperus rotundus* are useful.⁵ Tubers of *Cyperus rotundus* and its extracts have been used for alluring fish during harvesting in India. It shows higher enzymatic activity with the higher growth rate in fish.⁶

Considering the growing interest in the field of plant drugs assessing different Pharmacological activity. In this review we have discussed about the therapeutic potential and chemical constituents of *Cyperus rotundus*.

1.1 Vernacular name

Hindi	-	Motha, Nagamotha
Gujrati	-	Nagarmothaya
English	-	Nutgrass, purple nutsedge
Kanada	-	Koranari-gadde
Assamese	-	Keyabon
Malayalam	-	Korakizanna,
Marathi	-	Barik motha, Bimbal
Sanskrit	-	Muthakasu, Musta, Varida

1.2 Taxonomical classification

Kingdom	-	Plantae
Order	-	Poales (Cyperales)
Family	-	Cyperaceae
Genus	-	Cyperus
Species	-	rotundus

2. CHEMICAL CONSTITUENT & TRADITIONAL USES

The major chemical constituent in the extract of *Cyperus rotundus* rhizomes consist of essential oil and terpenoids, flavonoids, sesquiterpenes, monoterpenes, sitosterol and glycosides alpha-rotunol, betacyperone, β -selinene, camphene, calcium, cyperene, cyperenon, cyperol, cyperolon selinene, cyperotundone, D-copadiene, linolenic acid, linoleic acid, oleic acid, rotundene, rotundenol, rotundone, polyphenols, pectin, stearic acid, camphene, sugeonol, sugetrio.⁷

The plant of *Cyperus rotundus* is traditionally used as carminative, astringent, diuretic, anti-inflammatory, hepatoprotective, antipyretic, nervine tonic, anti-emetic, increased production of melanin.⁸ It was also used in food poisoning, indigestion and irritation of bowel syndrome, malaria, cough, bronchitis, renal and vesical calculi, amenorrhoea, dysmenorrhoea, deficient lactation, loss of memory, insect bites, dysuria, bronchitis, infertility, cervical cancer and menstrual disorders.⁹ According to the Ayurveda, *Cyperus rotundus* rhizomes were considered astringent, diaphoretic, diuretic, analgesic, antispasmodic, aromatic, carminative, antitussive, emmenagogue, litholytic, sedative, stimulant, stomachic, vermifuge, tonic and antibacterial.



Figure 1. Tubers of *Cyperus rotundus*



Figure 2. Plants of *Cyperus rotundus*

3. PHARMACOLOGICAL ACTIONS

3.1 Antidiarrhoeal actions

The methanolic extract of *Cyperus rotundus* rhizomes were shown antidiarrhoeal activity at the doses of 250 and 500 mg/kg in castor oil induced diarrhoea in mice.¹⁰ Das *et al* studied that aqueous extract of *Cyperus rotundus* tubers shows anti-giardial activity against infectious diarrhea. It was also shown anti-diarrhoeal action against adherence to enteropathogenic *Escherichia coli* and invasion of enteroinvasive *E. coli* and *Shigella flexneri* to Human epithelial type 2 (HEP-2) cells. Enterotoxins such as enterotoxigenic *E. coli*, heat labile toxin (HLT), heat stable toxin (HST), and cholera toxin (CT) was also assessed. It was found that the decoction reduces bacterial adherence to and invasion of HEP-2 cells. The production of HLT increased and binding with ganglioside monosialic acid receptor (GM₁) was decreased. The CT production was decreased and no effect on binding to GM₁.¹¹

3.2 Anti-inflammatory activity

Gupta M *et al.*, studied that methanolic and chloroform extract of *Cyperus rotundus* rhizomes shown the anti-inflammatory activity at dose of 400-600 mg/kg carrageenan-induced paw oedema in Wister rats.¹² Ahamad M *et al.* studied that drug extract was shown the anti-inflammatory activity at the dose of 300-500mg/kg/oral.¹³

3.3 Antibacterial activity

Prasad MP *et al.*, studied that *Cyperus rotundus* was shown antibacterial activity.¹⁴ It was also found that *Cyperus rotundus* oil was shown antimicrobial action against microbes like: *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Staphylococcus pyogenes*, *Escherichia coli*. The oil of *Cyperus rotundus* was shown a remarkable activity against Gram-positive bacteria less antibacterial activity was found against Gram-negative bacteria and no activity was observed with the oil against *Pseudomonas aeruginosa* and *Proteus vulgaris*.¹⁵

3.4 Antipyretic activity

Singh N *et al.* also found that the alcoholic extract of *Cyperus rotundus* shown antipyretic activity.⁶ It was also observed that alcoholic extract of *Cyperus rotundus* shown highly significant ($P < 0.001$) antipyretic action against pyrexia produced in albino rats by the subcutaneous injection of suspension of dried Brewer's yeast in gum acacia in normal saline.¹⁷

3.5 Anti-oxidant activity

Sayed HM *et al* studied the antioxidant and α -amylase inhibitory activities of some of the isolated phenolic compound of aerial parts of *Cyperus rotundus*.¹⁸ Sirivastav S *et al*, it was found that *in vitro* antioxidant activity methanol extracts of *Cyperus rotundus* more than that of ethanol extract due to its high flavonoids content. Inhibition of DPPH free radical and reducing power higher in methanolic extract as compared to ethanolic extract.¹⁹

3.6 Hypolipidemic activity

In a study, Okwu1 *et al* observed that the bioactive compounds present in *Cyperus rotundus* rhizome responsible for hypolipidemic potentials.²⁰ According to Chandrate *et al* alcoholic extract of *Cyperus rotundus* at the dose level of 70mg/kg/day, 140 mg/kg/day, 280mg/kg/day shown more improvement in lipid profile after 15 days of treatment.²¹

3.7 Insecticidal and plasmodicidal activity

It was also observed that *C. rotundus* shown ovicidal and larvicidal activities against *Aedes albopictus*.²² Singh *et al* in 2009 reported that the hexane extract of *Cyperus rotundus* shown repellent activity against different species of mosquito. It was also found that *Cyperus rotundus* shown comparatively better action than that of DEET (N, N diethyl- 3-methylbenzamide). Therefore, the extract can be an effective and safe for personal protective measure against mosquito bite.²³ The hexane extract of *C. rotundus* rhizomes also exhibited high potency against *Plasmodium falciparum*, a malarial parasite. Qualitative assessment of the antimalarial activity *in vitro* was determined by means of microculture radioisotope technique.²⁴

3.8 Anti-amoebic activity

It was also observed that *in vitro* studies the whole plant of *Cyperus rotundus* was shown better anti-amoebic activity against *Entamoeba histolytica* trophozoites. In another study it was also found that, the ethanol extract *Cyperus rotundus* (whole plant) shown 100% inhibition at a concentration 500 μ g/ml after 96 h.²⁵

3.9 Analgesic activity

Hydro-alcoholic extract of *Cyperus rotundus* shown analgesic activity at the dose of 50, 100 and 200mg/kg, have investigated for the anti-nociceptive activity of in mice. A dose of 200 mg/kg showed the maximum inhibition percentage of licking in early (61.60%) and late phase 87.41%.²⁶

3.10 Anti-ulcer activity

In histamine induced gastric ulcer method, the tuber powder of *Cyperus rotundus* at the dose of 1.25 gm/kg shown significant reduction of the ulcer index.²⁷ From this study we can conclude that it also posses anti-ulcer activity.

4. CONCLUSION

It is a perennial plant and is one of the most invasive weeds known, having spread out to a world-wide distribution in tropical and temperate regions. The plant is mentioned in the ancient Ayurvedic literature like Charaka Samhita.

This review gives broad information about different bioactive components and ethnopharmacology along with the scientifically claimed medicinal uses of *Cyperus rotundus*. It also possess large number of medicinal applications in treatment of different human ailments.

Different plant constituents like: carbohydrates, proteins, quinones, β -cyanins, terpenoids and caumarins have been reported

to be present in different parts of *Cyperus rotundus*. The plant possesses various pharmacological actions like: hypolipidemic, anti-ulcer, analgesic, insecticidal, plasmodicidal, anti-pyretic, antioxidant properties. It contains many secondary metabolites such as sesquiterpenes (with diverse skeletons such as patchoulane, rotundane, eudesmane, guaiane, cadinane and caryophyllene types), quinones, flavonoids (visnagin, khellin, ammiol, isorhamnetin, and triclin), saponins, alkaloids, phenolic acids (salicylic acid, protocatechuic acid, caffeic acid and p-coumaric acid), coumarins and steroids (steroidal glycoside, sitosterol(6'-hentiactonoyl)- β -D-galactopyranoside). Therefore, there is need for investigation and quantification of different phyto-constituents present and its pharmacological profile.

REFERENCES

1. Meher B, Dash DK, Roy A. A Review On Phytochemistry, Pharmacology and traditional uses of *Tamarindus indica* L, WJPPS. 2014; 3(10): 229-240.
2. Al-Snafi AE. A review on *Cyperus rotundus* A potential medicinal plant. IOSR Journal of Pharmacy. 2016; 6(7) 32-48.
3. Singh N and Pandey BR. Phyto-pharmatherapeutics of *Cyperus rotundus* L., Indian Journal of Natural Products and Recourses. 2012; 3(4):467-476.
4. Das B, Pal D, Haldar A. A review on *Cyperus rotundus* as a tremendous source of Pharmacologically active herbal medicine, IJGP. (2015); 9(4):198-203.
5. Lydia J, Sundarsanam D. Phytoconstituents of *Cyperus rotundus* L that Attribute to its Medicinal Value and Antioxidant Properties, IJPSR. 2012; 3(9):3304-3308.
6. Rambabu M, Patro B. Feeding Stimulatory Effects of *Cyperus Rotundus* Tubers on *Carrhinus Mrigala*, Journal of the Indian Fisheries Association. 2004; 31:145-153.
7. Singh A, Singh N. Ethno-Pharmaco-therapeutic Activities of *Cyperus rotundus*. IJMAS. 2016; 3(2):186-194.
8. Srivastava S, Mishra G. *Cyperus rotundus* (Nagarmotha)-An Important Medicinal Plant: A Review. IJPR. 2015; 1(1):11-22.
9. Al-Snafi AE. A Review on *Cyperus rotundus* A Potential Medicinal Plant. IOSRJP. 2016; 6(7):32-48.
10. Uddin S, Mondal K, Shilpi JA, Rahman MT. Antidiarrhoeal activity of *Cyperus rotundus*. Fitoterapia. 2006; 77(2):134-136.
11. Das B, Pal D, Haldar A. A review on *Cyperus rotundus* as a tremendous source of Pharmacologically active herbal medicine. IJGP. 2015; 9(4):198-203.
12. Gupta M, and Banerjee D. Studies of anti-inflammatory, antipyretic and anti-analgesic effect of aqueous extract of traditional herb. IJP. 2013; 4(4):113-120.
13. Ahmad M, Rehman AB, Mahummad R, and Wazir A. Assessment of Anti-inflammatory, Anti ulcer and Neuro Pharmacological activities of *Cyperus rotundus* L. PJPSC. 2014; 27(6):2241-2246.
14. Prasad MP. Analysis of Antimicrobial Compounds in *Cyperus rotundus* and *Azadirachta indica* against human pathogens. IJCMAS. 2014; 3(3):206-210.
15. Nima ZA, Jabier MS, Wagi RI, Hussain HA. Extraction, identification and antibacterial activity of *Cyperus* oil from Iraqi *C. rotundus*. Eng Technol. 2008; 26:1156-1159.
16. Singh N. A pharmacological study of *Cyperus rotundus*. IJM. 1970; 5(8): 103-109.
17. Gupta MB, Palit TK, Singh N, Bhargava KP. Pharmacological studies to isolate the active constituents from *Cyperus rotundus* possessing anti-inflammatory, anti-pyretic and analgesic activities. IJMR. 1971; 59: 76-82.
18. Sayed HM. Fructose-amino acid conjugate and other constituents from *Cyperus rotundus* Natural Product Research, Part A: Structure and Synthesis. 2008; 22(17): 1487-1497.
19. Sirivastav S, *Cyperus rotundus* (Nagarmotha)-An Important Medicinal Plant: A Review. IJPR. 2015; 1(1):11-22.
20. Okwu GN, Abanobi SE, Nnadi UV, Ujowundu CO, Ene AC. OJBRR. 2015; 7(3):132-138.
21. Chandratre RS, Chandarana S, Mengi SA. Lipid lowering activity of alcoholic extract of *Cyperus rotundus*. IJRPC 2011; 1(4): 1042-1045
22. Kempraj V, Bhat SK. Ovicidal and larvicidal activities of *Cyperus giganteus* Vahl and *Cyperus rotundus* L. Essential oils against *Aedes albopictus* (Skuse). Nat Prod Radiance. 2008; 7:416-9.
23. Singh SP, Raghavendra K, Dash AP, Evaluation of hexane extract of tuber of root of *Cyperus rotundus* L. (Cyperaceae) for repellency against mosquito vectors. J Parasitol Res. 2009; 1-5.23

24. Thebtaranonth C, Thebtaranonth Y, Wanauppathamku S, Yuthavong Y. Antimalarial sesquiterpenes from tubers of *Cyperus rotundus*: Structure of 10,12-peroxycalamenene, a sesquiterpene endoperoxide. *Phytochemistry*.1995; 40:125-8.
25. Kabbashi AS, Osman EE, Amel M, Abuzeid AN, Garbi MI, Waleed S, Mahmoud M K. Antiamoebic activity and cytotoxicity of ethanolic extract of *Cyperus rotundus* L. *Advancement in Medicinal Plant Research*, 2015;3(4):155-161.
26. Sharma A, Singh N, Bharadwaj R. Ethno-Pharmaco-therapeutic activities of *Cyperus rotundus*. *IJMAS*. 2016; 3(2):186-194.
27. Mohammad A, Nagarajaiah BH, Kudagi BL. Experimental Evaluation of Antiulcer Activity of *Cyperus rotundus*. *AJBP*. 2012; 2(2):261-268.