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A PHYTOPHARMACOLOGICAL REVIEW OF VALUABLE AYURVEDIC HERB *MUSTA* -CYPERUS ROTUNDUS LINN.

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ABSTRACT

Research in medicinal plants, for eternal health has made mankind to conscientiously explore - the nature itself. The ancient Ayurvedic texts provides enormous scope for exploration in order to tour the therapeutic application of a drug in different region and era. Growing naturally in subtropical, tropical and temperate climates Ayurveda science state that *Musta* have abundant history of use for several conditions like stomach and intestinal diseases, as well as anti-malarial, anti-inflammatory, anti-pyretic, anti-diabetic purpose. A member of *cyperaceae* family *musta* is an important medicinal herb used in various ancient system of medicine. The present review is designed to highlight the chemical composition and pharmacological effects of the drug - *Cyperus rotundus*.

KEYWORDS: *Cyperus rotundus*, Anti-malarial activity, Anti-spastic activity, Anti-hyperglycaemic activity, Anti-oxidant activity.

INTRODUCTION

Herbal medicine is a major constituent in all traditional medical systems, and a common base for the treatment in Siddha, Ayurvedic, Homeopathic, Naturopathy systems of medicine. *Cyperus rotundus* Linn is a well-known example of medicinal plant having huge medicinal prospective and also being authenticated by modern science, used since ancient times. *Cyperus rotundus* belonging to *Cyperaceae* family is commonly known as *Motha*. *Cyperaceae* is the largest family in the monocotyledons contain of 109 genera and approximately 5,500 species.[1] Several descriptions and various uses regarding *Cyperus*

rotundus is available in our Vedic literature, Nighantu and Samhitas since long years ago. *Cyperus rotundus* also known as nutgrass, is a common perennial weed with slender. flaky creeping rhizomes, tubers which are about 1-4 cm long. The tubers are externally blackish in colour and reddish white inside, and have a characteristic odour. *Cyperus rotundus* stems grow to about 25 cm tall and have leaves which are linear in shape, dark green in colour and grooved on the upper surface. *Cyperus rotundus* is native to India, but are now found in tropical, subtropical and temperate regions.[2] There are some other identified species by the name and its type are C. esculentus Linn, C. scariosus R. Br. and C. pangorei Rottl.[3] The used part of *Cyperus rotundus*is root tuber and used in disease of *Kapha Dosha*, fever, and ailments of digestive system.

Table No. 1: Synonyms of *Musta* mentioned in *Nighantu.*

S.N.	Synonyms	*Amarakosha*[4]	*Dhanvantari N.*[5]	*Madanapal N.*[6]	*Raj N.*[7]	*Kaiyadeva N.*[8]	*Bhavapraksha N.*[3]
1	*Golomi*	+	-	-	-	-	-
2	*Gandali*	+	-	-	-	-	-
3	*Shakulakshaka*	+	-	-	-	-	-
4	*Kuruvinda*	+	-	-	+	-	+
5	*Ghana*	-	+	+	+	-	-
6	*Bhadramusta*	-	+	+	-	+	+
7	*Kolakasheruka*	-	-	-	-	-	-
8	*Gangeya*	-	+	-	+	-	-
9	*VaraMusta*	-	-	-	-	-	-
10	*Gangeyi*	-	-	-	-	+	-
11	*Bhadramustaka*	-	-	+	-	-	-
12	*Ambudhara*	-	+	-	-	-	-
13	*Megha*	-	+	-	+	-	-
14	*Rajakasheruka*	-	+	-	+	+	-
15	*Abda*	-	+	+	-	+	-
16	*Jimuta*	-	+	-	+	-	-
17	*Jalada*	-	+	-	-	-	-
18	*Nadeya*	-	+	-	-	-	-
19	*Pindamusta*	-	+	+	-	+	-
20	*Nagara*	-	+	+	-	-	-
21	*Ambhoda*	-	-	-	+	+	-
22	*Gundra*	-	-	-	-	-	+

Table No. 2: *Ras panchak (characteristics) of Musta in Nighantu.*

Nighantu	*Ras*	*Guna*	*Virya*	*Vipak*	*Doshprabhav*
Dhanvantri nighantu[5]	*Tikta, Kashaya*	-	*Shita*	-	*Conciliate KaphaRakta*
Raj nighantu[7]	*Tikta, Kashaya*		*Shita*		
Kaiyadev nighantu[8]	*Tikta, Kashaya*		*Shita*	*Katu*	*Conciliate kapha pitta rakta*
Bhavprakash nighantu[3]	*Katu, Tikta, Kashaya*		*Shita*	*Katu*	

Vernacular Names of Musta[3]

- *Assam: Mutha, Somad Koophee*
- *Bengali: Mutha, Moothoo, Musta*
- *English: Nut grass*
- *Gujarati: Motha, Moth, Nagarmoth*
- *Hindi: Motha, Mutha, Nagarmotha*
- *Kannada: Konnari Gadde, Tungegadde, Tungahulli, Badramusti*
- *Malayalam: Muttanna, Muthanga*
- *Marathi: Bimbal, Motha, Moth, Nagarmoth*
- *Punjabi: Mutha, Motha*
- Sinhalese: Kalanduru
- Telugu: Tunga, Tungamustalu, Musta, Bhadramusta

Chemical Constituents of Cyperus rotundus[9]

The major chemical constituents of *Musta* - 4α, 5α, Oxidoeudesm-11-en-3α-ol, Cyperene-1, Cyperene-2, β-selinene, Cyperenone, α-cyperone.

The other chemical components include Copadiene, Rotundome, Cyperenol, Cyperolone, Eugenol, Cyperol, Isocyperol, α-and β-rotunol, Mustakone, Kobusone, Isokobusone, Cyperotundone, Epoxyguaiene, Sugenol, Surgeonol, Patchoulenone, Sugetriol triacetate, Rotundenol, Rotundene, Isopatchoula3,5-diene, β- sitosterol, pinene, alcohol- isocyperol, linolenic, linolic, oleic, myristic and stearic acids and glycerol.

Various types of *Musta*

In *Bhavaprakash nighantu, Bhavprakash* mentions 3 types of *Musta*[3]

1) Nagarmusta
2) Musta
3) Kaivartamusta

In *Raj Nighantu* there is three types of *musta*[7]

1) Nagarmusta

2) Musta

Three varieties of *Musta* mentioned in all the *Brihatrayees* and *Nighantus*

1) Nagarmusta

2) Bhadramusta

3) Kaivarta or Kshudramusta

Indian Medicinal Plants (Kirtikar and Basu) second edition vol 4 mentioned *Cyperus rotundus* have three type[10]

1) *Cyperus scariosus* Br.

2) *Cyperus rotundus* Linn.

3) *Cyperus esculentus* Linn.

Taxonomical Classification of *Cyperus rotundus*[11]

- Kingdom: Plantae
- Subkingdom: Tracheobionta
- Super division: Spermatophyta
- Division: Magnoliophyta
- Class: Liliopsida
- Subclass: Commelinidae
- Order: Cyperales
- Family: Cyperaceae
- Genus: Cyperus.L
- Species: *Cyperus rotundus L*.

Aamayik prayog of Musta

- In *BhavaPrakasha* Nighantu, *bhavprakash* explained that *Lauha Bhasma* mixed with *Musta churna* taken with decoction of *Khadira* useful in *Halimaka*.[12]
- In glandular Erysipelas, arid grain flour with *musta, makashika, devdaru, guduchi* and *bhallataka, shilajit* preparation is used[13]
- Decoction *of Musta, Draksha* and *Haridra* mixed with *Makshika* should be taken in *vatarakta* predominant in kapha[14]
- In *Sushrut samhinta,* Acharya *Sushruta* mention that Decoction of *Musta* alone mixed with *makshika* should be taken in case of Diarrhoea. The rhizome of *Musta* boiled with milk is also beneficial in the treatment of Diarrhoea[15]
- In *Mustadi Vati, musta* is main content which is useful in loose teeth.[16]

Important formulations of *Musta*[17,18]

1. *Ashokarista*
2. *Ardrakakhandawaleha*
3. *Gulmakatanala Rasa*
4. *Mahalakshadi Taila*
5. *Kutajashtaka kvatha*
6. *Mustakadi Churna*
7. *Mustakadi Lehya*
8. *Mustakadi Lehya*
9. *Mustakarishta*

Important pharmacological actions *of Musta* as per *Ayurveda*

According to various ayurvedic texts and references, *Musta* is a very important and potential drug. It is *tikta Kashaya* in *rasa, katu* in *vipak* and *shita viryatmak*, so it exhibits - *Balya, Raktaprashadana, Daha nashan, Dipana, Atisaraghn, Grahi, Jwaraghna, Kaphaghna, Krimihar, Lekhaniy, Medhya, Kantiprada, Mootrala, Nadibalya, Pachana, Sangrahaka, Shothaghn, Stanyajanana, Stanyashodhana, Sthoulyahara, Trishnanigrahana, Tvakdoshaghna, Vishaghna, Vranaghna* activities.

Pharmacological Activity of *Cyperus rotundus*

Anti-malarial activity

An in vitro study was conducted to assess the action of hexane extracts of the crude air-dried tubers of Cyperus rotundus against Plasmodium falciparum. The results showed the remarkable anti-malarial activity of Cyperus rotundus.[22]

Anti-spastic activity

In a study, Ethanolic extract of *Cyperus rotundus* produced relaxation of rabbit ileum and shows spasmolytic effect against contractions induced by acetylcholine, barium chloride and 5-hydroxitriptamine, showing a direct relaxant action on the smooth muscle.[23]

Anti-hyperglycemic activity

An in vivo study showed that different fractions (chloroform, ethyl acetate, acetone, and methanol) of hydroethanol extract, have antihyperglycemic effects in Sprague Dawley rats in alloxan induced diabetes model. The high level of polyphenols showed the antioxidant property which is responsible for its antihyperglycemic effect.[24]

Coronary vasodilator activity

An aqueous extract of a rhizome of *Cyperus rotundus* was administered intravenously in cats, rabbits, and frogs[25] which proved the efficient coronary vasodilation activity as compared to standard.

Wound healing activity

A study shows alcoholic extract of tuber parts of *Cyperus rotundus* have wound healing property in the form of ointment. For this study three types of wound models of rats taken, the excision, the incision and dead space wound model. The extract ointments showed adequate difference in response in all the above said wound models as compared to standard drug nitrofurazone ointment (0.2 % w/w NFZ). It was revealed that alcoholic extract of *Cyperus rotundus* have greater wound healing activity.[26]

Anti-microbial activity

Assessment of in vitro antimicrobial activity of ethanolic and aqueous extract of *Cyperus rotundus* agar disc diffusion method was carried out. Study showed that aqueous extract was ineffective, while the ethanolic extract proved effective against all the tested bacterial strains.[27]

Anti-oxidant activity

Rhizome of *Cyperus rotundus* extracted crudely, and it was found that they have significant antioxidant activity by using non-enzymatic haemoglobin glycosylation method.[28]

The plant extract of *Cyperus rotundus* with high concentration of polyphenols, flavonoids, ascorbic acid, and other active ingredients may be the cause of its antioxidant potential.[29]

Anti-obesity activity

In a study, obese albino rats fed with high fat cafeteria meal is used for assessment of anti-obesity activity of the aqueous tuber extract of *Cyperus rotundus*. The result showed the significant weight reduction in obese albino rats.[30]

Anti-ulcer activity

In an in vivo study with two distinct animal models used for the investigation showed the powder of *Cyperus rotundus* rhizomes have ulcer preventive properties. The study reveals strong antioxidant activity of *Cyperus rotundus* causes it to have antiulcer properties.[31]

Anti-bacterial Activity

Another study shows the oil of *Cyperus rotundus* have a remarkable activity against gram-positive bacteria Staphylococcus aureus and Enterococcus faecalis.[32]

DISCUSSION

Cyperus rotundus, commonly known as nut grass had been mentioned in many ancient lexicons of Ayurveda. The main useful part is tubers or rhizomes and is used for treating innumerable diseases. The primary phytochemical component of *Cyperus rotundus* are -n essential oils, triterpenes, polyphenol, alkaloids and flavonoids. In Ayurveda, it is described to be used for treating diseases like Jwara, trishna, aruchi, krimi, etc. It also shows various pharmacological activities like anti-bacterial activity, wound healing activity, anti-obesity activity, anti-oxidant activity. The present review shows that the single drug *Cyperus rotundus* exhibit potent ability to cure multiple diseases and used in multiple formulations as determined in this study.

CONCLUSION

The literature review collected from different lexicons and web sources suggests that *Cyperus rotundus* exhibits multiple pharmacological activities and is being very routinely used in medical practice. It is the famous drug found among the various ayurvedic and traditional formulations used by local practitioners all over India. Apart from the above described studies in the article, the drug must be studied for its clinical use as coronary vasodilator activity and also many other important pharmacological activities should be further explored.

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