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Review Article

A REVIEW OF MEDICINAL PROPERTIES ON *MUSTA* (*CYPERUS ROTUNDUS* LINN.)

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KEYWORDS: *Mustaka*, *Cyperus Rotundus*, Classical uses.

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ABSTRACT

Ayurveda, the life science is chiefly based on herbal medicines. According to Ayurveda, the physician should have utmost knowledge regarding herbs to become successful in the field of treatment. These days herbal medicines are more popular than modern medicine because of their effectiveness, easy availability, low cost and for being comparatively devoid of side effects. So, these herbs are backbone of Ayurveda. *Musta (Cyperus rotundus)* belonging to *Cyperaceae* family is an important medicinal plant used in various Indian system of medicine. A detail description about this plant has been found from Vedic period to recent time in various Ayurvedic texts. The nut-grass is an erect, perennial glabrous herb 10-75cm long, distributed throughout the plains of India, as a weed in waste lands, gardens and roadsides from sea level 1,800m elevation. *Musta* is composed of various chemical constituents mainly Cyperene-1, Cyperene-2, β-selinene, Cyperenone, α-cyperone, Rotundome etc. which are responsible for the many therapeutical effects. *Musta* is having *Tikta, Katu, Kashaya Rasa, Laghu, Ruksha Guna, Sita Veerya* and *Katu Vipaka* with *Kapha-Pittahara* properties. It also posses pharmacological action likes anti-inflammatory, hepatoprotective, anti-pyretic, anti-malarial, anti-Obesity, anti-diabetic etc. It has *Sthoulyahara, Dipana, Pachana, Grahi, Jwaraghna* properties so has been indicated in *Agnimandya, Jwara, Sangrahani, Swasa, Stanyavikara, Sutikaroga, Amavata* etc. So, a detail review of this medicinal plant with various aspects is definitely a good step ahead in a new direction in herbal medicinal field.

INTRODUCTION

Cyperus Rotundus belonging to Cyperaceae family is commonly known as *Motha*. A lot of descriptions and various uses regarding this plant is available in our *Vedic* literature, *Nighantu* and *Samhitas* since long years ago. It is found throughout India. It grows gregariously in aquatic and sub-aquatic region. So it is named as *Musta.*[42] The genus name *Cyperus* is an ancient Greek name whereas the species *Rotundus* is a Latin word which means round and refers to the tuber. World-wide the Cyperaceae family comprises about 104 general and more than 5000 species; although number varies greatly differ due to taxonomic concepts of individual researchers. World-wide, the Carex is the largest genus with about 2000 species followed by Cyperus with about 550 species. It is a perennial glabrous herb 10-75cm long, Distributed throughout the plains of India, as a weed in waste lands, gardens and roadsides from sea level 1,800m elevation. It is actually a field weed known in all the Southern States as nut grass. Several chemical substances have been identified in *Cyperus Rotundus* which includes Cadalene, Cyprotene, Flavonoids, Sesquiterpenes, Terpenoids, Mustakone, Isocyperol, Acyperone, Rotundene, Valecine, Kaempferol, Luteolin, Quercetin,

Patchoulenone, Isopatchoulenone, Sugeonylacetate, cellulose triacetate and Sugebiol. A Sesquiterpene, Rotundone, so called because it was originally extracted from the tuber of this plant, is responsible for the spicy aroma of black pepper and the peppery taste of certain Australian Shiraz wines. The plant is mentioned in the classical Ayurvedic textual for fevers, digestive system disorders, dysmenorrhoea, and other maladies. The drug also posses pharmacological action likes anti-inflammatory, anti-pyretic, anti-malarial, anti-Obesity, anti-diabetic, hepatoprotective etc. It has *Dipana, Pachana, Grahi, Sthoulyahara, Jwaraghna,* properties so has been indicated in *Agnimandya, Jwara, Amavata, Swasa, Stanyavikara, Sutikaroga, Sangrahani* etc*. Musta* is considered as best for *Sangrahi* (Astringent), *Deepana* (appetizer), *Pachana* (Digestive) drug as per *Acharya Charaka* in *Sutrasthana* and again *Musta* along with *Parpataka* is the best remedies for *Jwara* as per *Acharya Vagabhatta*.

In the present scenario the society depend on plants not only for diet but also for the medicinal purposes. In our classical textual it has been explained that a single drug posses potent ability to cure multiple diseases. So, it needs to be authenticated scientifically to prove that what written in our classical literature are quite true. So, a review on *Cyperus Rotundus* has been compiled here to highlight the importance of *Cyperus Rotundus* which will provide a new direction for researchers in the future.

Materials & Methodology

Review of various classical textual and Journals have been carried out to compile the medicinal properties of *Musta (Cyperus rotundus).* In addition to this, by the help of Internet and Google search a comprehensive data has been generated and compiled here on *Cyperus Rotundus.*

Classification

- ***Charaka Samhita:***[1] *Triptighna, Trishna-nigrahana, Lekhaniya, Kandughna, Stanya-shodhana, Mutravirechaniya, Madhura skandha, Tikta skandha.*
- ***Sushruta Samhita:***[2] *Mustadi, Vachadi*
- ***Astanga Hridaya:***[3] *Mustadi, Vachadi, Rodhradi, Eladi*
- ***Bhavaprakasa Nighamtu:***[4] *Karpuradi*
- ***Dhanvantari Nighamtu:***[5] *Guducyadi*
- ***Kaiyadev Nighamtu:***[6] *Ausadhivarga*
- ***Madanpal Nighamtu:***[7] *Abhayadi*
- ***Priya Nighamtu:***[8] *Shatapushpadi*
- ***Raj Nighamtu:***[9] *Pippalyadi*
- ***Nighantu Adarsha:***[10] *Karpuradi*
- ***Sodhala Nighamtu:***[11] *Guducyadi*

Scientific Classification [12, 13]

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

Synonyms [4- 6, 9, 14, 15, 28, 29]

The various synonyms are *Abda, Abhra, Ambhoda, Ambudhara, Arnoda, Banya, Bhadrakashi, Bhadrakshi, Bhadramusta, Gajakasheru, Gangeya, Ghana, Granthi, Granthila, Gundra, Gunja, Hima, Jalada, Jalavaha, Jimuta, Kachchhotha, Kachhola, Kakshottha, Kasheru, Krodakasheruka, Krodeshtha, Kuru, Kurubilwa, Kurubinda, Kutannata, Megha, Meghaksha, Musta, Mustaka, Musthaw, Nadeya, Nagraa, Nagaramustaka, Nirada, Pindamusta, Pindamustaka, Pithara, Prachya, Purnakostha, Rajakaseruka, Sugandhi, Vadhrahansa, Valya, Varah, Varahada, Varahi, Varida, Varidhara, Varidra, Vindakhya, Vishadwanshi, Vrishadhwakshi.*

Vernacular Names [15-19, 28]

- Assam: *Mutha, Somad Koophee*
- Bengali: *Mutha, Moothoo, Musta*
- Bombay: *Barikmoth, 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*
- Mundari: *Batha-bijir*
- Punjabi: *Mutha, Motha*
- Santali: *Tandisura*
- Sinhalese: *Kalanduru*
- Tamil: *Kora, Korai, Korai-Kizhangu*
- Telugu: *Tunga, Tungamustalu, Musta, Bhadramusta*
- Urdu: *Sad Kufi*

Habitat [15, 16, 17]

Distributed throughout the plains of India, as a weed in waste lands, gardens and roadsides

from sea level 1,800m elevation. It grows in moist areas, rice fields and along water courses. In damp areas of West Bengal, Uttar Pradesh, eastern and southern part of India.

Morphology [15-17, 20, 28]

The nut-grass is an erect, perennial glabrous herb 10-75cm long, bearing hard, black, fragrant tubers. The tubers measure around 1 to 3.5cm in length and are white and succulent when young, later turning brown and hard clothed with flexuous hairs. The leaves originate from the base of the plant and are arranged on the stem in groups of three, 10-18cm long, narrowly linear, smooth, shiny and dark green, with a grooved upper surface and a sharp tip. The flowers are borne in clusters at the ends of the stems. The inflorescence consists of around three to nine stalks of varying lengths which are reddish-brown to purple (spikelets). The nut-grass produces a dry, single-seeded fruit, which is 1.6mm long and broadly obovoid, trigonous and grayish black. Fruiting occurs throughout the year, but chiefly during rainy season.

Types of *Musta* [4, 9, 15, 27, 30- 32]

There are mainly three varieties of *Musta* mentioned across all the *Brihatrayees* and *Nighantus.*

1) *Nagarmusta*
2) *Bhadramusta*
3) *Kaivarta or Kshudramusta*

Amarkosha has 3 varieties of *Musta*

1) *Kuruvinda*
2) *Bhadramusta*
3) *Chudala*

So, according to *Amarkosha, Bhadramusta* and *Nagarmusta* are the same. But it is not the same to other *Granthas*. In *Brihatrayees* there is no mention of *Nagarmusta.*

Bhavaprakash mentions 3 types of *Musta*

1) *Nagarmusta*
2) *Musta*
3) *Kaivartamusta*

Raj Nighantu mentions two varieties

1) *Nagarmusta*
2) *Musta*

Kaseru according to *Raj Nighantu* is *Kshudramusta. Kaseru* is scirpus kyssor.

Saligram Nighantu mentions three types

1) *Nagarmusta*
2) *Bhadramusta*
3) *Kaivartamusta*

According to Indian Medicinal Plants (Kirtikar and Basu) second edition vol 4 :

1) *Nagarmusta*- Cyperus scariosus Br.
2) *Bhadramusta*- Cyperus rotundus Linn.
3) *Kshudramusta*- Cyperus esculentus Linn

According to *Bhaisajya Ratnavali, Musta* are 3 types of as per habitat:

1) *Anupadeshastha Musta* (Marshy land)-Best
2) *Mishrit Deshajanya Musta* (Mixed type of lands)-Medium
3) *Jangal Deshajanya Musta* (Dry land)-Worst

Chemical Constituents [19, 21, 28]

The Major chemical constituents of *Musta* are 4α, 5α, Oxidoeudesm-11-en-3α-ol, Cyperene-1, Cyperene-2, β-selinene, Cyperenone, α-cyperone. The other chemical constituents include Copadiene, Epoxy guaiene, Rotundome, Cyperenol, Cyperolone, Eugenol, Cyperol, Isocyperol, α-and β-rotunol, Cineol, Copaene, Mustakone, Kobusone, Isokobusone, Cyperotundone, Epoxyguaiene, Sugenol, Surgeonol, Patchoulenone, Sugetriol triacetate, Rotundenol, Rotundene, Isopatchoula-3,5-diene, β- sitosterol, pinene, alcohol- isocyperol, linolenic, linolic, oleic, myristic and stearic acids and glycerol.

Ayurvedic Properties [19-20, 22, 23]

- ***Rasa:*** *Tikta, Katu, Kashaya*
- ***Guna:*** *Laghu, Ruksha*
- ***Veerya:*** *Sita*
- ***Vipaka:*** *Katu*
- ***Doshakarma:*** *Pittakaphahara, Shleshmaraktajit*

***Karma* (Action)** [4-9, 19, 20, 22-24, 28]

Musta is a very much potent drug as it posses *Atisaraghni, Balya, Dahanashini, Dipana, Garbhashayasankochaka*, *Grahi, Jwaraghna, Kantiprada, Kaphaghna, Krimighna, Lekhana, Medhya, Mootrala, Nadibalya, Pachana, Raktaprashadana, Sangrahaka, Sothahara, Stanyajanana, Stanyashodhana, Sthoulyahara, Trishnanigrahana, Tvakdoshahara, Vishaghna, Vranaghni* properties according to various classical textual.

It is also Carminative, Diaphoretic, Diuretics, Demulcent, Emmenagogue, Galactogogue, Stimulant, Stomachic, Tonic, Vermifuge in nature so, very useful for various pharmacological actions.

Pharmacological Action [18, 25]

Anti-Inflammatory Activity [43]

Biradar et. al evaluated the effects of oils in anti-inflammatory activity in rats. On the basis of that experiment, it can be stated that essential oil

posses a good anti-inflammatory due to the presence of beta- Sitosterol and flavonoids.

Wound healing activity [44]

Puratchikody *et. al* reported that, the alcoholic extract of tuber parts (500gm) of *Cyperus Rotundus* was examined for wound healing activity as ointment in three types of wound models in rats (the excision, incision and dead space wound model). The ointments showed considerable difference in wound closure time and tensile strength in all wound as compared to standard drug nitro furazone ointment (0.2%w/w NEZ).

Anti-microbial Activity[45]

Sharma *et. al* investigated that, the ethanolic extract of Rhizome of *Cyperus Rotundus* was found to exhibit highest activity against tested bacteria. However all extracts were found to be ineffective against fungal strains.

Anti-convulsant activity [46]

Shivakumar *et. al* investigated the anti-convulsant effect of *Cyperus Rotundus* rhizomes against maximal electroshock and pentylenete-trazole induced tonic seizers in albino rats. The result showed that the ethanol extract of *Cyperus Rotundus* rhizomes and the flavonoids present in ethanol extract is essential for treatment of epilepsy and could be attributed for anticonvulsant activity.

Hepato protective activity [47]

Kumar *et. al* investigated that, Ethyl acetate extract and two crude fractions solvent ether and ethyl acetate of the rhizomes of *Cyperus Rotundus* were evaluated as hepatoprotective activity in rats by inducing liver damage by carbon tetrachloride.

Anti-obesity activity [48]

Athesh *et. al* reported the anti-obesity potential of the aqueous tuber extract of *Cyperus rotundus* L. (ATECR) in high fat cafeteria diet (HFCD) fed obese rats. The result shows the significant weight reduction activity.

Anti diabetic activity [49]

Raut *et. al* reported the anti-diabetic activity of fractions of hydro-ethanol extract of *Cyperus Rotundus.* The result of that experiment suggested that, fractions possess anti-diabetic activity attributed to the presence of polyphenols.

Anti oxidant property [50]

Parast *et. al* reported that the hydro alcoholic extract of *Cyperus Rotundus* posses efficient capacity to reduce harmful effect free ions, especially against DPPH and superoxide anions. So it can be stated that *Cyperus Rotundus* root extract has a potent superoxide radical scavenging effects.

Anti-Platelet Activity [51]

Seoa *et. al* investigated the anti-platelet effects of *Cyperus Rotundus* by examining their effects on platelet aggregations in rats.

Anti-malarial activity [52]

It was investigated that the crude hexane extracts of the air-dried tubers of *Cyperus Rotundus* is having high potency in the in vitro test against Plasmodium falciparum (ECso = 0.66 pg ml- 1); the result showed the significant anti-malarial activity of *Cyperus Rotundus.*

Phyto-Chemical Properties [19]

The extractive value and ash value of heartwood are

Foreign matter- Not more than 2 percent.

Total ash- Not more than 8 percent.

Acid-insoluble ash- Not more than 4 per cent.

Alcohol-soluble extractive- Not less than 5 percent.

Water-soluble extractive- Not less than 11 percent.

Volatile oil- 1 percent

Indication [4-9,17-20,22-24,28]

The drug *Musta* is indicated in accidental wound, *Agnimandya, Ajirna,* alcoholism, *Amadosha, Amavata, Apasmara, Aruchi, Atisara, Daurbalya,* Epilepsy, Erysipelas, *Grahani Roga, Halimaka, Jwara, Kandu, Kaphapaittikavikara, Kasa, Krimiroga,* loose teeth, *Mastishka daurbalya, Mutrakricchra, Netraroga, Pama, Pitajwaratisara, Rajorodha, Raktavikara, Sangrahani, Shwasa, Stanyavikara, Sutikaroga, Trishna, Twaka vikara, Vamana, Vatarakta, Vishavikara.*

Ethnopharmacological Uses [15, 29]

Part of *Musta* Indication

Tubers: fever, Diarrhoea, Dysentery, Dyspepsia, Vomiting, Cholera.

Fresh tuber: Paste is applied as galactogogue. Paste is applied in Scorpion sting and spreading ulcer.

Root: Leprosy, Thirst, Fever, blood diseases, Biliousness, Dysentery, Pruritus, Pain, Vomiting, Epilepsy, Ophthalmia, Erysipelas.

Bulbous root: Dysentery, Gastric disorders, Intestinal Disorder.

Therapeutic Uses [26]

- Decoction of *Musta* along with *Parpata, Ushira, Chanadana, Balaka* and *Sunthi* etc. are useful in fever and thirst.[33]
- According to *Acharya Sushruta*, Decoction of *Musta* alone should be taken mixed with honey in case of Diarrhoea. The rhizome of *Musta* boiled with milk is also beneficial in the treatment of Diarrhoea.[34]
- *Acharya Bhava Prakasha* explained that *Lauha-Bhasma* mixed with *Musta* powder should be

taken with decoction of *Khadira* in case of *Halimaka.*[35]

- Use of parched grain flour prepared with *Musta* and *Bhallataka, Maksika, Devadaru* and *Guduchi* and *Silajatu* is efficacious in glandular Erysipelas.[36]
- In *Vatarakta* predominant in *Kapha*, decoction of *Musta, Draksha* and *Haridra* mixed with honey should be taken. Similarly that of *Triphala* or *Guduchi* is useful.[37]
- According to *Acharya Charaka,* water boiled with *Musta* digests the pathos. It should be used in all types of alcoholism.[38]
- *Mustaka* is the main drug in *Mustadi Vati* useful in loose teeth.[39]
- *Sarkaradi* formulation should be given mixed *Musta* and *Maricha* in cough caused by *Pitta* associated with *Kapha.*[40]
- In order to control vomiting caused by *Kapha*, powder of sour *Badara* mixed with *Jambu* seeds; *Karkatasringi*, mixed with *Musta* or *Duralabha* and mixed with honey should be taken.[41]

Parts Used [16, 17, 19, 20, 23, 28]

Tubers/ bulbous root/ rhizome

Dose [18, 19]

3-6 gm. (Powder)

20-30 ml. *(Kwath)*

Important Formulations [19, 28, 31]

1. *Ardrakakhandawaleha*
2. *Ashokarista*
3. *Gulmakatanala Rasa*
4. *Kutajashtaka kvatha*
5. *Mahalakshadi Taila*
6. *Mustakadi Churna*
7. *Mustakadi Kwatha*
8. *Mustakadi Lehya*
9. *Mustakarishta*
10. *Piyushvallavi Rasa*
11. *Shadangapaneeya*
12. *Darvyadi kvatha*
13. *Dhanyapanchaka kvatha*
14. *Vatsakadi churna*
15. *Stanyashodhana kashaya*

Substitute [18]

The various species of Cyperus genus are used as substitute of *Cyperus rotundus* which are mentioned below.

- *Cyperus amabilis* Vahl
- *Cyperus esculentus* Linn
- *Cyperus platystilis* R.Br.
- *Cyperus scariosus* R.Br.

Toxicology [28]

The LD_{50} of petroleum ether extract of the root was 50mg/kg and ED_{50} was 1.6mg/kg. Intra-peritoneal.

Safety Aspects [18]

The drug is traditionally to be safe in the dosage mentioned.

CONCLUSION

In our classical textual it has been explained that a single drug posses potent ability to cure multiple diseases. So, it needs to be authenticated scientifically to prove that what written in our classical literature are quite true. *Cyperus Rotundus (Musta)* is an important traditional Indian medicinal plant used in wide range of medical treatments. This is because of the multi-faceted therapeutic properties which the single herbs possess. The standardization of the drugs in terms of modern parameter by using the new techniques and relevant instruments is the need of the hour for our today's society. It is the right time to do more work on this herb to further explore the wonderful therapeutic properties for the benefit of the mankind.

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