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A Comprehensive Review on Cyperus Rotundus [Nagarmotha]

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ABSTRACT : -

Utilizing herbal stores to preserve health is a very ancient technique. Over the years, there has been a brief increase in the market for herbal medicines. This is because herbal items have positive effects on the health of living systems. Cyperus rotundus, a perennial grass in the Cyperaceae family, is also known by the names nagarmotha, grandiloquent nutsedge, and nutgrass. It's a cunning cannabis factory that has established itself in almost every tropical, tropical, and temperate location. It is a widely used factory in traditional drug systems, particularly in Ayurveda and folk systems worldwide, for its beneficial medicinal properties in treating a variety of ailments, including cholera, skin conditions, diabetes, sprains and bruises, fever, stomach aches. and furuncle infections.

Key words: Nagarmotha, cyprotene, flavonoids, and Cyperus rotundus

INTRODUCTION :-

Each across India, there's a factory called as motha(Cyperus rotundus). It's a member of the Cyperacea family. The Latin term meaning round, rotundus, relates to the tuber, and is the source of the rubric name Cyperus. Cypeiros was the rubric's ancient Greek name [1].The family has around 5000 species and 104 genera worldwide, while the exact number varies widely amongst researchers because of their various taxonomic views. With over 2000 species worldwide, Carex is the biggest genus, followed by Cyperus with roughly 550 species [2] . Plant-based medications are used by the majority of people worldwide to treat a variety of illnesses. Around the world, it is always crucial in the treatment of many human and animal illnesses. Growing awareness of natural products is a result of increased research on plants and plant products in emerging nations. Herbal medications are widely used in both conventional and contemporary medical systems [3]. Commonly referred to as Nagarmotha, Cyperus rotundus is a member of the Cyperaceae family and is used extensively in traditional medicine worldwide to cure a wide range of illnesses. This plant is also referred to as motha, mussa, purple nutsedge, or nutgrass, and it has anti-inflammatory, antidiabetic, antidiarrheal, and antipyretic properties [4] . It is a dangerous perennial weed that emerges from subterranean tubers and has dark-colored, almost glabrous culms. Sincerely, it is a disciplinary weed known as nut grass throughout the Southern States. The plant grows rosettes of leaves, scapes, and umbels above the floor and rhizomes, tubers, basal

bulbs, and fibrous roots beneath the neath floor[5] .The presence of phyto-chemicals in them is significant for medicine because they have biological characteristics and have been used as building blocks for synthetic medications. They play a significant part in both domestic and international markets for the nutraceutical and cosmetic industries [6-7].The World Health Organisation classifies herbal medicines into three categories: medical herbal products, processed plant materials, and raw plant materials [8] . Secondary metabolites are important organic chemicals found in therapeutic plants that have a specific, appropriate, and harmonious physiological function on the biological system and do very little harm. [9,10,11]

BOTANICAL DESCRIPTION :-

The perennial herbaceous plant Cyperus rotundus L. is a member of the Cyperaceae family. It bears flowers nearly all year round on thin, scaly, creeping rhizomes that emerge independently from the square, one to three centimeter-long tubers that are bulbous at the base of the stem. The C. rotundus tubers were noted to be red-white inside and achromatic on the outside, having a distinct odour. Nagarmotha plants are estimated to be 140 cm tall, and its leaf squares have linear measurements. C. rotundus produces a square, petite inflorescence with 2-4 bracts that is made up of tiny flowers with crimson husks. The nut grass is an oblong-ovate, three-angled, yellow-colored unripe tuber that turns black when it ripens.[12]

DISTRIBUTION :-

While others claim that its origins are more widely distributed and include northern and eastern Australia, it is thought to have started in India and spread throughout the world. This worldwide species can be found in temperate, tropical, and subtropical climates. It can be found in 92 nations. In the Western Indian Ocean, C. rotundus was found in the Caucasus (Armenia, Azerbaijan, Russian Federation), Middle Asia (Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan), Eastern Asia, and Western Asia (Afghanistan, Iran, Iraq, Saudi Arabia, Yemen, Palestine, Lebanon, Syria, Turkey). Europe (Austria, Switzerland, Albania, Bulgaria, Croatia, Greece, Romania, Serbia, Slovenia, France, Portugal, Spain); Pacific (Marshall Islands, Micronesia, Northern Mariana Islands); North America (USA, Mexico); and China, Japan, Korea, Taiwan, India, Nepal, Pakistan, Sri Lanka, Myanmar, Thailand, Vietnam, Indonesia, Malaysia, Philippines) [13,14,15]

- **HABITAT:-**

It can withstand disruptions in its habitat and is frequently seen growing in waste areas and moist, humid cultivation sites . It is a severe weed in cultivated regions and can grow in practically every kind of soil, as well as at any height, humidity, soil moisture content, and pH .[16]

- **Chemical constituents :-**

Colorful supplementary metabolites were set up in C. Rotundus , counting sesquiterpenes (which have different configurations, counting patchoulane , rotundane , eudesmane , guaiane , cadinane , and caryophyllene feathers) , quinines , flavonoids (visnagin , khellin , ammiol , isorhamnetin , and tricin), saponins , alkaloids , phenolic acids (salicylic sharp , protocatechuic sharp , caffeic sharp , and pcoumaric sharp) , coumarins , and steroids(steroidal glycoside , sitosteryl - (6'- hentriacontanoyl) – β - dgalactopyranoside) . The sum of introductory canvases (0.19) , particular graveness (0.9689) , and refractive train (1.54051) were measured in C. Rotundus rhizomes . From C . Rotundus , 52 supplementary metabolites were mended . The primary factors of C. Rotundus oil painting were oxo- α- ylangene(9.35) , α- cyperone(9.07) , trans- pinocarveol(7.92) , and cyperene(7.83) .

By the by, the taking after introductory canvases were untangled from C. Rotuntdus rhizomes, along with a rate α- pinene2.87 , cyclopentene-3-ethylidene-1-methyl0.24, sabinene0.43 , β- pinene2.13 , p- cymene, naphthalene, 1,6- dimethyl- 4-(1- methyl ethyl)1.09, α- silenene0.55, cis-calamenene0.42, trans- calamenene0.57, elema-(13)- trien-12-ol0.64, caryophyllene- oxide2.86, cis-12-caryophyll-5-en-2-one2.4, caryophylla- 2(12), 6(13) dien-5-one1.95, cyclohexane,- trimethyl, 3,5 bis- 1- methyl ethyl)0.97, cyclo- hexenone,- trimethyl(3- methyl- butadienyl)1.06, isopropyl, 4a β, 8a β- dimethyl3.69, longiverbenone1.09 , 10- epi- α- cyperone1.00 , oxo- α- ylangene9.35 , α ” cyperone9.07, caryophyllenol2.11, vulgarol A1.13, vellerdiol0.77, aristolone3.54, vulgarol B0.98, ledenoxide1.34, dimethyl-7-isopropenyl-bicyclo- Dec-1-en-3-one2.95, longifolinaldehyde0.27 and longipynocarvone2.95(Gohary, 2004; Bisht, 2011).

On the other hand, introductory canvases made up 0.2(w/ w) of the wild- growing C. rotuntdus tubers in the Iranian locale of Isfahan. Its abecedarian oil painting yielded sixty typically passing chemicals. Sesquiterpene chemicals made up the larger part of the oil painting's composition . Cyperene (16.9), caryophyllene oxide (8.9), α- longipinane(8.4), and â- selinene(6.6) were the oil painting ingredients. [17,18,19]

- **Phytochemistry:**

Phytochemistry: Essential oils, flavonoids, terpenoids, sesquiterpenes, cyprotene, cyperene, aselinene, rotundene, valencene, cyperol, gurjunene, trans-calamenene, cadalene, cyperotundone, mustakone, isocyperol, acyperone, etc. are the main chemical components of C. rotundus [20]

- **MEDICINAL USES :-**

According to Ayurvedic literature, C. rotundus rhizomes are astringent, antitussive, aromatic, diaphoretic, diuretic, analgesic, antispasmodic, carminative, emmenagogue, litholytic, sedative, stimulant, stomachic, vermifuge, tonic, and antibacterial. Given the ingredients in it, it works wonders for indigestion. For instance, a variety of enzymes aid in digestion and function as catalysts for several biochemical activities involving minerals and carbohydrates. It is also helpful in the treatment of metabolic, psychiatric, and nutritional disorders. The following conditions are treated with them: amenorrhea, dysmenorrhea, indigestion, memory loss, nausea, dysuria, bronchitis, fever, malaria, cough, bronchitis, renal and vesical calculi, urinary infections, skin diseases, wounds, dyslepsia, flatulence, diarrhoea, dysentery, intestinal parasites, infertility, cervical cancer, and menstrual disorders. [20,21,22]

FIG . 1 CYPERUS ROTUNDUS

- **TABLE 1: TAXONOMIC CLASSIFICATION OF CYPERUS ROTUNDUS :-** [23]

Taxonomic Rank	Taxon
Kingdom	Plantae
Division	Angiosperms
Class	Dicots
Subclass	Commelinids
Order	Poales
Family	Cyperaceae
Genus	Cyperus
Species	Rotundus
Common names	Nut-grass, Nagarmotha

- **TABLE 1: VERNACULAR NAMES OF CYPERUS ROTUNDUS :-**[24,25]

English	Coco grass, Nut-grass, Nutsedge, Purple nut-grass, Purple nutsedge
Hindi	Nagarmotha, Korehi-jhar, Motha, Mutha

Sanskrit	Chakranksha, Charukesara Abda, Ambuda
Urdu	Saad kuf
Arabic	Soad, Soadekufi
Bengali	Nagarmotha, Moothoo, Musta,
Burma	Vomonniu
Gujarat	Nagaramothaya
Malaya	Mushkezamin
Turkish	Topalak
Telugu	hadra-muste, Gandala, Kaivartakamuste.
Germany	Nußgras, Rundeszypergras
Japanese	Hamasuge
Thailand	Yahaeo mu, Yakhon mu
Nepalese	Mothe
Chinese	Hsiang-fu, Suo cao
Arab	Suadkuf
Italian	Ciperoorientale, Ciperorotondo
Spanish	Castañuela, Cebollin
Persian	Mushkzer-e-zameen
Portuguese	Junça, Junca-aromatica

- **PHARMACOLOGICAL ACTIVITY :-**

1. Anti-diarrhoeal :-

Uddin et al. investigated Cyperus rotundus's anti-diarrheal qualities using castor oil-induced diarrhea in mouse models. The study found that oral administration of methanolic extract at doses of 250 and 500 mg/kg b.w. demonstrated strong anti-diarrheal properties. Jabier et al. conducted research on Cyperus rotundus's antimicrobial properties. They employ a few bacterial species, including gram-positive and gram-negative. For example, Cyperus rotundus oil showed the greatest inhibitory effects on gram-positive bacteria in comparison to gram-negative bacteria . [26]

2. Anti – Obesity :-

The lipolytic effect of C. rotundus preparations (powder in fine suspension, aqueous and alcoholic extracts) helped to alleviate obesity in rats by mobilizing fat from their adipose tissues. [27]

3. Insect repellency activity:-

In a lab setting, hexane extract from the tuber of the plant Culex rotundus was tested for its ability to ward off the mosquito vectors Anopheles culicifacies, Anopheles stephensi, and Culex quinquefasciatus. The impact of the C. rotundus tuber extract on mosquito vectors was investigated, and a comparison with N,N-diethyl-3-methylbenzamide was made. The laboratory experiment's results demonstrated that, even at low doses, tuber extracts are more effective at repelling the complete mosquito vector [28]

4. Wound healing activity:-

The purpose of this study was to assess the extract of C. rotundus tuber sections' capacity to treat wounds. The excision, incision, and dead space wound models on rats were used to test the wound-healing properties of an alcoholic extract of C. rotundus tuber parts used as an ointment. When compared to conventional medication nitrofurazone ointment (0.2% w/w NFZ), the extract ointments shown significant differences in response in all of the aforementioned wound models in terms of wound contracting ability, wound closure time, and tensile strength [29]

5. Antiplatelet activity :-

The well-known oriental traditional medicine C. rotundus has been shown to have broad spectrum activity in a variety of biological systems, including the circulatory system.Little is known about its antiplatelet activity, though. The purpose of this study was to look at the antiplatelet properties of C. rotundus EtOH extract (CRE) and the components that make it up. Materials and procedures: Rat platelet aggregations in vitro and ex vivo, as well as mouse tail bleeding times, were used as metrics to assess the antiplatelet activities of CRE and its eight constituent chemicals. Findings: In the in vitro platelet aggregation experiment, CRE inhibited collagen, thrombin, and/or platelet aggregation in a substantial and concentration-dependent manner. It was discovered that of its eight constituents, (+)-nootkatone had the strongest inhibitory action on collagen, thrombin, and AA-induced [30]

6. Insect-related behavior :-

A study was carried out to evaluate C. rotundus's phytochemical screening and insecticidal testing. It works almost as well as organophosphate and is more effective than carbamate. The results indicate that C. rotundus ranked top because all test animals (ants) perished after 10 seconds (10); Organophosphate ranked second with 9 ants dead after 10 seconds; and Carbamate ranked last with 7 dead after 12 seconds [31]

7. Ovicidal and larvicidal activity:-

Aedes albopictus eggs and fourth-instar larvae were used to test the ovicidal and larvicidal effects of essential oils isolated from C. rotundus tubers. The larvae and eggs were observed for a whole day after being subjected to a series of oil concentrations ranging from 5 to 150 ppm. The oils exhibited noteworthy larvicidal and ovicidal properties, as demonstrated by EC50 values below 5 ppm and LC50 and LC90 values below 20 ppm. The findings indicated that these Cyperus species' essential oils may provide a natural source of insecticidal chemicals [32]

8. Antispasmodic activity:

The anti-diarrheal and anti-spasmodic properties of an aqueous extract of C. rotundus rhizomes (ACR) were examined. ACR's anti-diarrheal and antispasmodic effects were assessed in mice given castor oil-induced diarrhea and at doses of 125, 250, and 500 mg/kg during a charcoal meal test. The percentage of diarrhea that was inhibited by ACR 125, 250, 500 mg/kg (po) and loperamide 2 mg/kg dose (po) was 30.36%, 37.90%, 45.45%, and 92.45%, respectively. Intestinal transit was inhibited by ACR 125, 250, and 500 mg/kg (po) and atropine sulfate 2 mg/kg dosage (po), in that order, by 24.35%, 31.48%, 36.75%, and 55.94%, respectively. These findings suggested that ACR inhibits intestinal motility to achieve its anti-spasmodic and anti-diarrheal effects by reducing intestinal secretions and secretions, respectively [33]

9. Antimalarial activity: -

Through activity-guided research on C. rotundus tubers, compounds such as 4,7-dimethyl-l-tetralone, 10,12-peroxycalamenene, caryophyllene oxide, and patchoulenone were isolated. These compounds have antimalarial activity within the range of ECso 10-4-10-6 M. Among them, 10,12-peroxycalamenene, a new ndoperoxide sesquiterpene, shows the highest impact at ECso 2.33 × 106 M [34]

10. Antioxidants Activity:

A 50% methanolic C. scariosus plant shown a potentially significant capacity to scavenge radicals and prevent oxidative DNA damage. The extracts of C. scariosus did not cause any harm to U937 cells. TPC, TFC, and ASC were identified in order to obtain more understanding of the foundation of their antioxidant property. The extract's noticeably high TPC and TFC concentrations support its antioxidant properties [35,36]

11. Hepatoprotective activity :-

Rats were used to test the hepatoprotective potential of ethyl acetate extract and two crude fractions, solvent ether and ethyl acetate, from the rhizomes of C. rotundus (Cyperaceae) by inflicting carbon tetrachloride-induced liver injury. At an oral dose of 100 mg/kg, the ethyl acetate extract significantly reduced serum levels of total bilirubin, alkaline phosphatase, glutamic pyruvic transaminase, and glutamic oxaloacetic transaminase. Sections of liver were histopathologically examined to support these biochemical observations. As a positive control, silymarin was employed. The brain Na +/K+-ATP-ase extract from C. rotundus had a strong inhibitory effect on the rat brain's crude enzyme Na+/K+-ATP-ase [37,38]

12. Anti- cancer activity :-

In a study using neuro-2a cells to evaluate plants for tumoricidal properties, C. rotundus ethanolic extract showed only mild to moderate anticancer activity (LC50=2.528-4.939 mg/ml estimated from dose-dependent cell death). C. rotundus essential oil was found to be highly effective against L1210 leukaemia cell lines in another study. There was a strong correlation between this outcome and greater apoptotic DNA fragmentation [39,40]

13. Hemodynamic Hypotensive activity -

The alcoholic extract of C. rotundus increased perspiration and caused a steady and progressive drop in blood pressure. The extract did not change the effects of acetylcholine or adrenaline on blood pressure, but it partially prevented the effects of histamine [41]

14. Toxicological studies –

In order to conduct the test, bred wistar strain rats weighing 250–300 g, representing both genders, were chosen for the investigation. The animals were kept in clean, natural light/dark cycles in polypropylene cages with six rats per cage. Water and a regular pellet feed were provided to the animals without restriction. The acute toxicity investigation was conducted in accordance with OECD/OCDE 423, the OECD Guideline for Chemical Testing. The Acute Toxic Class Method was adopted on December 17, 2001, for Acute Oral Toxicity. As a result, the oral acute toxicity tests showed that the C. rotundus rhizome extract was safe up to a dosage of 2000 mg/kg. In Wistar rats, another acute toxicological study revealed no death or morbidity up to 2000 mg/kg body weight. Subchronic poisoning.[42]

15. Cytoprotective effects :-

Effects that are cytoprotective The C. rotundus rhizome decoctions shown ulcer inhibitory efficacy, or cytoprotective properties against the stomach damage caused by ethanol. Initially, rats must receive 1.25, 2.5, or 4.0 g of crude drug/kg orally, 30 minutes before receiving 10 mL/kg of ethanol (40% v/v), which, depending on dosage, has an ulcer-inhibiting effect. Additionally, when the decoction was administered subcutaneously (0.3–0.6 g/kg), similar action was also seen, and it has systemic effects that protect the stomach. Rats treated with ethanol had their stomach motility considerably slowed when the decoction was administered orally (2.5–4.0 g/kg) or subcutaneously (0.3 g/kg), as compared to the controls. The stomach protective effect of Candida rotundus was considerably diminished by pretreatment with indomethacin (5 mg/kg). [43]

16. Anticonvulsant activity :-

Action of anticonvulsants Mice that were pretreated with an ethanolic extract of C. rotundus showed a strong protective effect against convulsions caused by strychnine and leptazol. The rhizome ethanol extract (100 mg/kg, p.o. (pour on animals)) considerably decreased the length of the convulsion and hind limb extension ($p<0.001$), which was equivalent to the standard drugs phenytoin (25 mg/kg, i.p.; Indian Pharmacopoeia) and diazepam (4 mg/kg, i.p.; Indian Pharmacopoeia), respectively.

These findings imply that the rhizome's ethanol extract is worth using to create a powerful phytoconstituent for the treatment of epilepsy, and that the extract's flavonoids may be responsible for its anticonvulsant properties .[44]

CONCLUSION :-

Despite being a common plant and being regarded as a noxious weed, C. rotundus has a wealth of significant pharmacological and therapeutic qualities. The rhizomes and tubers of this perennial herb are its most potent portions. Because it contains a variety of secondary metabolites, it is valuable and significant for medical purposes. Natural chemicals with plant origins, in example, have been used for centuries and are thought to be safe for use by both humans and animals due to extensive testing and safety studies.The genuine truth that C. rotundus is a favoured treatment among the many ethnic teams, ayurveda, and antique practitioners for treatment of various disorders was displayed by screening of the literature available on the plant. The moment has come to conduct some practical study in order to extract ever-more-valuable data from nut grass. It is the frosting of the cake that removes the various chemicals and makes it available for commercial reasons by using various ways due to its widespread and common distribution. This plant is a valuable medical herb due to its many qualities. In order to get ever-greater benefits from Nagamotha, researchers ought to investigate this plant's therapeutic potential.

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