A REVIEW ON: HERBAL MOUTHWASH CONTAINING HYDROCHLORIC EXTRACT OF PONGAMIA PINNATA AND NAGARMOTHA

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# ABSTRACT

The objective of present work is to formulate and evaluate herbal mouthwash and to evaluate. Its effectiveness against microbial load of oral cavity. Herbal mouthwashes are mouthwashes which are prepared from natural plant extracts. The use of Herbal mouthwash has grown advantage over chemical mouthwashes due to their non-irritant and non-staining properties andit does not contain alcohol. The natural extracts present in these herbal mouthwashes are obtained from various plant leaves, fruits, seeds and various tree oils.

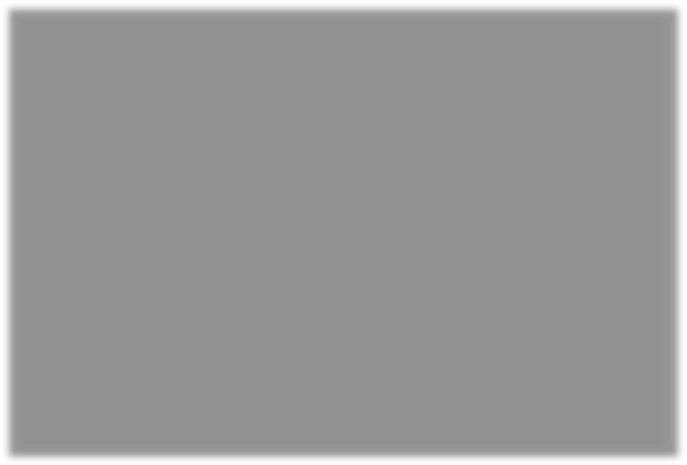
**Keywords:** Fabaceae, Pongamia Pinnata, Anticacinogenic, Herbal

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# INTRODUCTION

Herbal mouthwash is a natural solution used. To remove plaque & prevents oral infection Unlike regular mouthwash, it contains no sugar or alcohol, which bacteria Feed to cause bed breath Herbal mouthwash avoids these harmful ingredients & has no reported side effects. This makes it a safer choice for oral hygiene. Mouthwashes are liquids with anti-inflammatory antimicrobial, & analgesic properties (1).



**Fig no 01**. Pongamia Pinnata

There are two main types:

* Herbal mouthwashes:

They are made from natural ingredients called phytochemicals, offer anti-microbial & anti- inflammatory benefits without using alcohol or artificial additives. They contain herbs like neem. Clove & peppermint, which are known for cleansing & healing effects. Clove, for instance has antiseptic properties, while peppermint provide a cooling sensation. Other herbs such as Triphala, Tulsi & Neem are proven to help withoral health issues like bleeding gums, ulcers & tooth decay without side effects.

Today, more people are turning to natural herbal products for both the prevention & treatment of diseases plants being abundant source of healing properties, are valuable for various pharmacological Formulations. Ayurvedic medical plants in particular are, widely used for treatment because they tend to have little to no side effects, making them safe for long-term use Studies have tested numerous Ayurvedic mouthwashes both in laboratory & real-life settings, showing their potential for daily oral care (3).

Ayurvedic medicine provides a holistic approach that supports both overall & oral healthcreating a balanced environment essential for well-being in today’s world.

Herbal mouthwashes offer several benefits over chemical ones :

1. They are gentle & don’t cause irritation or staining
2. They have fewer side effects & safer overall.
3. They’re ideal for people with sensitive mouths.
4. Naturally antibacterial due to ingredients like polyphenols.
5. No harsh additives so they are less abrasive on the teeth
6. They don’t cause dry mouth, unlike many chemical options

Uses (4):

* 1. To enhance oral hygiene.
  2. For eradicating bacteria present in oral cavity.
  3. To control dental plaque.
  4. To cover bed breath and refresh the breath.
  5. For gum disease prevention.
  6. To relieve pain and inflammation
  7. To treat mucositis (swelling and irritation in the mouth) and halitosis (bad breath)

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# PLANT PROFILE

**PLANT PROFILE**

Introduction (5)

The Pongam Tree, scientifically known as Pongamia pinnata, is one of India’s brightest and richest trees. The name “Pongamia” originates from Tamil, with “pinnata” referring to its pinnate leaves. Belonging to the Leguminosae family and the Papilionaceae subfamily, it is called” Ponga,” “Pongam,” or “Punku” in Tamil, and “Karanj” or “Kanji”.

They are made from natural ingredients called phytochemicals, offer anti-microbial & anti-inflammatory benefits without using alcohol or artificial additives.

**VERNACULAR NAME (6):**

**Table no. 01** Vernacular name of Pongania Pinnata

|  |  |
| --- | --- |
| **Languages** | **Vernacular name** |
| Hindi | Karanj |
| Marathi | Karanja |
| English | Indian beech |
| Telgu | Pungu |
| Malayalam | Punnu |
| Asam | Karchuw |
| Punjab | Pahari |

**COMMON NAME :**

* Millettia pinnata (L.) Panigrahi
* Derris indica (Lam.)
* Pongamia glabra Vent.
* Pongamia pinnata Merri
* Bennett Millettia novo-guineensis Kane. & Hat

**TAXONOMICAL CLASSIFICATION (7,8):**

**Table no. 02** Taxonomical Classification of Pongamia Pinnata

|  |  |
| --- | --- |
| Kingdom | Plantae |
| Division | Magnoliophytes |
| Class | Magnoliopsida |
| Order | Fable’s |
| Family | Leguminosae |
| Genus | Pongamia |
| Species | Pinnata |

**MORPHOLOGICAL CLASSIFICATION:**

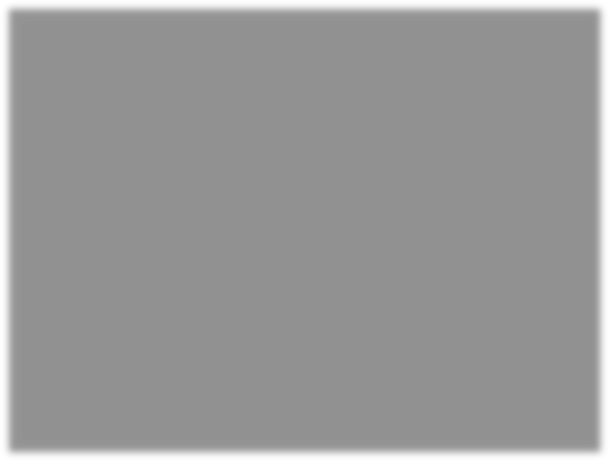
Leaf (9):

Light requirement: tree raises in full sun.

Soil tolerances: clay, loam, sandy, slightly alkaline, acidic, well-drained. Drought tolerance: high Vaporizer

Salt tolerance: moderate

Winter interest: no special winter



**Fig no 02.** Leaf of Pongamia Pinnata

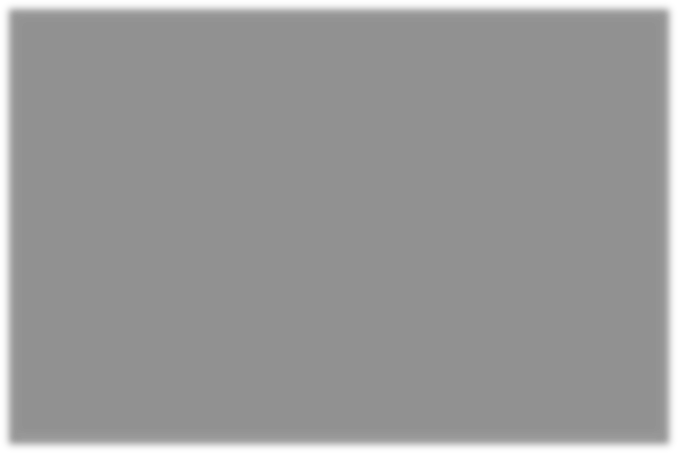
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Root :

Taproot is thick and long; lateral roots are numerous and well developed.

The spread of roots on this species, about 9 meters in 18 years, is greater than most other species



**Fig no 03.** Root of Pongamia Pinnata

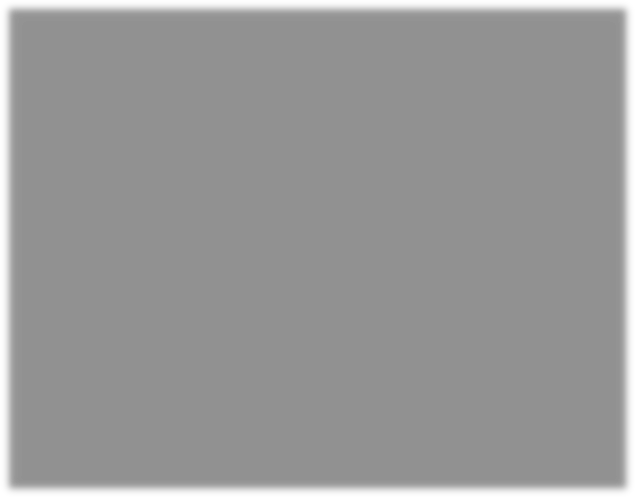
Flowers:

Lavender, violet, white, 2-4 together, pea-shaped, short-stalked, 15-18mm long.

White or purplish, bracteoles ovate.

Calyx campanulate, purplish, corolla pinkish-white, standard suborbicular, wings obliquely oblong, keel obtuse, stamens 10, Monadelphous, anthers versatile.

Ovary 2-ovuled, style incurved.

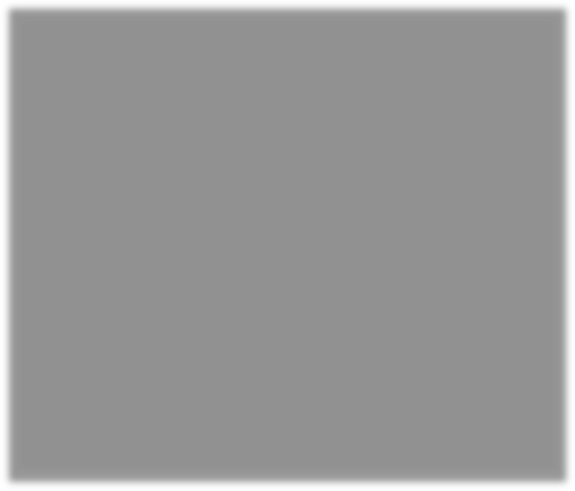


**Fig no 04.** Flowers of Pongamia Pinnata

Seeds (10):

Ovoid or elliptical, compressed, been-like, 10-15 mm long, dark brown, oil

Several unelectrified villages have used pongamia oil simple processing techniques, and diesel generators to create their own grid systems to run water pumps and electric lighting



**Fig no 05**. Seeds of Pongamia Pinnata

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* In Leaves Contain

# CHEMICAL CONSTITUENTS

Alkaloid Carbohydrates

Flavonoids- Kaempferol, Quercetin, Rutin Tannin

Saponin Phytosterol

* In Seeds Contain (11):

Korangi Kaempferol Kanugin Kankone

Alkaloids dimethoxy-kanugin Glabrin

Gamatay

Table no 03. Content of Seed

|  |  |
| --- | --- |
| **Components** | **Percentage** |
| Protein | 17.4% |
| Fatty oil | 27.5% |
| Crude fiber | 7.3% |
| Starch | 6.6% |
| Moisture | 19% |
| Ash | 2.4% |

* In Stem Bark Contain: Resin

Contains a bitter alkaloid Sugar

Mucilage

**From the stem bark of P. pinnata two new compounds (19,20):**

3-methoxy-(3,4-dihydro 3-hydroxy-4-acetoxy)-2, 2- dimethylpyrano-(7,8:5,6)-flavone 3-methoxy-(3,4-dihydro 4-hydroxy-3-acetoxy)-2,2- dimethylpyrano-(7,8:5,6)-flavone Isolonchocaprin

Dimethylallylflavonone

Uses :

It helps for freshen breath and kill bacteria that remain after brushing and flossing. It reduces the plaque and gingivitis, fight tooth decay and prevent cavities.

It maintains good oral hygiene.

Herbal mouthwash can be used before and after oral surgery procedures such as tooth extraction.

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PHARMACOLOGICAL ACTIVITIES

1. Anti-inflammatory activity (12):

\*Pongamia pinnata\* root extracts was evaluated by Singh and Pandey. Various extracts showed significant activity in carrageenan and PGE1-induced edema models, with the ethanolic and acetate extracts particularly effective, likely due to prostaglandin inhibition. The butanol extract was active in the carrageenan model but not in the PGE1 model, suggesting that intermediate-polarity constituents contribute to the activity, rather than lipophilic or highly polarones. Additionally, the petroleum ether extract of \*Pongamia pinnata\* seeds exhibited potent acute anti-inflammatory effects, while the aqueous suspension showed pro-inflammatory effects.

1. Antifungal and antibacterial activity:

Wagh et al. conducted a study to evaluate the antifungal and antibacterial properties of various concentrations of oil extracted from \*Pongamia pinnata\*. The oil was tested against \*Aspergillus niger\*, \*Aspergillus fumigatus\*, \*Staphylococcus aureus\*, and \*Pseudomonas aeruginosa\* using methods like Minimum Inhibitory Concentration (MIC) determination and the dry-weight technique. Chemical analysis of the oil, performed using gas chromatography (GC) and gas chromatography/mass spectrometry (GC-MS), revealed the presence of fatty acids.

1. Antiviral activity:

White Spot Syndrome Virus (WSSV) is a highly virulent and contagious pathogen responsible for White Spot Syndrome in shrimp, leading to significant mortality and severely impacting commercially important marine crustaceans worldwide. Rameshthangam and Ramasamy investigated the antiviral properties of bis(2-methylheptyl) phthalate, a compound isolated fromthe leaves of \*Pongamia pinnata\*, against WSSV in \*Penaeus monodon\* (tiger shrimp).

Their study showed that oral administration of an ethanolic extract and the purified compound from

\*Pongamia pinnata\* leaves enhanced the survival rate of WSSV-infected shrimp. The shrimp were fed pelletized feed infused with the ethanolic extract at doses of 200 and 300 µg pergram of shrimp body weight per day, both before and after infection.

1. Anti- oxidant activity (13):

Studies have shown that the extract of \*Pongamia pinnata\* leaves has significant effects on circulatory lipid peroxidation and antioxidant status in mice with ammonium chloride-induced

hyperammonemia. The treatment improved lipid peroxidation levels, which had been disruptedin hyperammonemia mice, as evidenced by a substantial reduction in key antioxidant markers such as superoxide dismutase (SOD), glutathione peroxidase (GPx), catalase (CAT), reducedglutathione, and vitamins E, A, and C.

The \*Pongamia pinnata\* ethanolic extract 5(PPET) was found to restore the oxidant-antioxidant balance in hyperammonemia conditions. This effect is attributed to its anti-hyperammonemia properties, including its ability to detoxify excess creatinine, ammonia, and urea, alongside its potent antioxidant activity. These findings suggest that \*Pongamia pinnata\* leaves may be effective in mitigating oxidative stress and related metabolic disturbances.

1. Anti- diarrhoeal activity (14):

The crude leaf extract of \*Pongamia pinnata\* (P. pinnata) has been shown to have a selective anti-diarrheal effect, specifically targeting cholera. While it does not exhibit antibacterial, anti- giardial, or anti-rotaviral properties, it reduces the production of cholera toxin and limits the ability of bacteria to invade epithelial cells. This suggests that the extract may be effective in managing cholera-related diarrheal symptoms.

1. Anti – ulcer activity (15):

The methanolic extract of \*Pongamia pinnata\* roots (PPRM) exhibit notable ulcer-protective properties, particularly in models of aspirin- and pyloric ligation (PL)-induced ulcers. However, its effectiveness is not as pronounced in protecting against ethanol-induced ulcers. Over a 10-day treatment period, PPRM also showed a tendency to reduce acetic acid-induced ulcers. The mechanism behind its protective effects appears to involve the enhancement of mucosal self- defense mechanisms. Specifically, PPRM seems to promote cell proliferation, prevent lipid peroxidation, and preserve the integrity of mucosal glycoproteins, while also supporting mucosal cell longevity and mucin secretion.

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# PLANT PROFILE

**NAGARMOTHA (Cyperus Rotundus)**

Introduction:

Humans have always depended on nature, as it has been the main source of medicines for thousands of years. Many important medicinal plants, which form the foundation of both traditional and modern medicine, come from nature. This is why plants are often called a “treasure house of potential drugs.” The natural compounds, or phytochemicals, found in these plants are valuable because they have biological properties and are often used to develop synthetic drugs.Herbal medicines have been a part of traditional healthcare systems worldwidefor centuries. In India, ancient texts like the \*Rigveda\*,

\*Ayurveda\*, \*Charak Samhita\*, and \*Sushruta Samhita\* highlight their use. Ayurveda, India’s oldest medical system, focuses on bothdisease treatment and prevention, utilizing nearly 600 medicinal plants. Similarly, in Europe, herbal medicines play a significant role in the pharmaceutical industry. Traditional Chinese Medicine, detailed in the ancient \*Materia Medica\* compendium, describes over 1,000 plant species and has been central to China’s healthcare practices for years. Major importers of Chinese herbal medicines include Japan, Hong Kong, Korea, and Singapore, accounting for 66%of China’s total exports (16).

In Africa, traditional herbal medicines remain the primary healthcare system, especially in Southand West Africa, with countries like Swaziland and Nigeria relying heavily on them. Turkey, with its rich plant diversity, is home to around 10,500 plant species, 30% of which are endemic. These examples showcase the global reliance on medicinal plants across cultures and regions (17).

COMMON NAME (18):

Java Grass, Purple nut seed, Nut seed

VERNACULAR CLASSIFICATION (19):

Table no o4. Vernaular name of Nagarmotha

|  |  |
| --- | --- |
| English | Coco grass, Nut-grass, |
| Hindi | Nagarmotha |
| Sanskrit | Chakranksha |
| Urdu | Saad kuf |
| Gujarat | Nagaramothaya |
| Telugu | Kaivartakamuste. |
| Malaya | Mushkezamin |

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TAXONOMICAL CLASSIFICATION (20):

Kingdom - Plantae Subkingdom - Tracheobionta Super division - Spermatophyta Division – Magnoliophyta Class - Magnoliopsida Subclass – Rosidae

Order - Fabales Family - Fabaceae

Genus - Pongamia Species - Pinnata

# PHYTOCHEMISTRY

PHYTOCHEMISTRY:

Sesquiterpenes:

\*Cyperus rotundus\* contains a variety of sesquiterpenes with diverse structures, including patchoulane, rotundone, eudemonic, guanine, cadinene, and caryophyllene types. Among these, patchoulane-type sesquiterpenes such as patchoulane-1 (cyperene-3,8-dione), patchoulane-2 (14- hydroxycyperotundone), patchoulane-3 (14-acetoxycyperotundone), patchoulane-4 (3β- hydroxycyperenoic acid), and patchoulane-5 (sugetriol-3,9-diacetate) are found in the plant.

Additionally, specific eudesmane compounds, including eudesman-6 and eudesman-7, as well asothers (e.g., eudesman-15–21 and 23–24), have been identified. Two novel sesquiterpenes, isocyperotundone and 1,4- epoxy-4-hydroxy-4,5-seco-guain-11-en-5-one, have also been reportedin \*C. rotundus\*. (21).

Flavonoids:

\*Cyperus rotundus\* contains a wide range of flavonoids, including vitexin, orientin, cinaroside, quercetin 3-O-β-D-glucopyranoside, and myricetin 3-O-β-D- glucopyranoside. Other notable flavonoids include isnagin, khellin, ammiol, isorhamnetin, tricin, luteolin derivatives (such as luteolin 3’-methyl ether, luteolin 7,3’-dimethyl ether, luteolin 5,3’-dimethyl ether, luteolin 4’-glucoside, and luteolin 7-Di glucoside), tricin 5-glucoside, and kaempferol. Additionally, a novel flavonol derivative, cyperaflavoside (myricetin 3,3′,5′- trimethyl ether 7-O-β-D- glucopyranoside), has been identified in this plant.

Essential oil:

\*Cyperus rotundus\* contains a significant number of essential oils with diverse chemical components. Some key compounds include α-pinene (2.87%), β-pinene (2.13%), sabinene (0.43%), p-cymene (0.18%), limonene (0.28%), and 1,8-cineole (0.36%). Notable alcohols and terpenes such as trans-pinocarveol (7.92%), terpinene- 4-ol (0.59%), citronellal (0.76%), and cyperene (7.83%) are also present. Other

compounds include trans-caryophyllene (3.08%), carvone (1.95%), α-copaene (3.02%), aromadendrene- epoxide (2.51%), caryophyllene oxide (2.86%), and α- cyperone (9.07%). Additionally, unique compounds like oxo-α-ylangene (9.35%), longifolinaldehyde (0.27%), and longipynocarvone (2.95%) are found in the plant. These essential oils contribute to the plant’s diverse chemical profile and potential therapeutic application. (22).

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Steroids:

\*Cyperus rotundus\* contains several known steroidal compounds and their derivatives. These include steroidal glycosides like sitosterol-(6’-hentriacontanoyl)-β-D-glucopyranosides, along with sitosterol, stigmasterol, sitosterol glucoside, and stigmasterol glucoside. Additionally, flavonoids such as chrysoberyl, kaempferol, luteolin, quercetin, rutin, and khellol-D-glucopyranoside are also present in the plant. These compounds contribute to the plant’s bioactive properties (23).

Phenolic compound:

Cyperus rotundus, commonly known as nutgrass, contains several important phenolic compounds, including p-hydroxybenzoic acid, protocatechuic acid, vanillic acid, ellagic acid,salicylic acid, caffeic acid, and p-coumaric acid, which are found in both its tubers and aerialparts. (24).

# PHARMACOLOGICAL ACTIVITIES

1. Antimicrobial activity (25):

The antimicrobial activity of \*Cyperus rotundus\* essential oil was evaluated using the disc agar diffusion method. The oil showed significant activity against Gram-positive bacteria such as

\*Staphylococcus aureus\* and \*Streptococcus\* species. It demonstrated moderate activity against

\*Sarcina lutea\*, \*Bacillus subtilis\*, the acid-fast \*Mycobacterium phlei\*, and fungi like

\*Candida\* species. However, the oil was completely inactive against Gram-negative bacteria. Extracts from \*Cyperus rotundus\* rhizomes (petroleum ether, chloroform, ethanol, and water) were tested against six pathogenic microbes, including \*Staphylococcus epidermidis\*, \*Bacillus cereus\*, \*Pseudomonas aeruginosa\*, \*Escherichia coli\*, \*Aspergillus niger\*, and \*Candida\*. Antibacterial and antifungal activities were assessed using agar well diffusion and serial dilution methods. Among the extracts, the ethanolic extract showed the highest antibacterial activity, comparable to standard drugs, but none of the extracts were effective against fungal strains.

1. Anti-inflammatory and analgesic activity (26,27):

The anti-inflammatory and analgesic properties of \*Cyperus rotundus\* have been extensively studied. The alcoholic extract (70% alcohol) demonstrated significant anti-inflammatory effectsin albino rats against carrageenan-induced edema and formaldehyde-induced arthritis. Similarly,the crude extract of \*Cyperus rotundus\* at doses of 300 mg/kg and 500 mg/kg showed a significant anti- inflammatory effect compared to saline and aspirin-treated groups.

The essential oil of \*Cyperus rotundus\* was evaluated for its anti-inflammatory, anti-arthritic, and analgesic properties in rats. The results indicated dose-dependent activity, with a significant reduction in paw edema from the second hour after carrageenan injection. At doses of 250 mg/kgand500 mg/kg, the essential oil significantly reduced inflammation, with a 75.54% inhibition of paw edema on the 10th day at 500 mg/kg, comparable to the effects of Diclofenac sodium.

Analgesic effects were observed in both the neurogenic (0–5 min) and inflammatory (15–30 min) phases of formalin-induced pain, with higher doses (500 mg/kg) effectively inhibiting both phases.

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1. Anti-cancer Activity:

Toxic, antitumor, and antimutagenic activities of \*Cyperus rotundus\* extractsand essential oils have been studied extensively:

* 1. \*\*Toxicity Assessment\*\*: The ethanolic extract of \*Cyperus rotundus\* was evaluated using the brine shrimp bioassay and compared to the standard drug etoposide. The extract showed no significant toxic effects atconcentrations of 10, 100, and 1000 μg/ml.

1. Antioxidant Activity (28):

The antioxidant activity of \*Cyperus rotundus\* rhizome extract (CRRE) was tested using various in vitro methods. The extract showed a concentration- dependent ability to scavenge harmful molecules such as superoxide anion radicals, hydroxyl radicals, nitric oxide radicals, and hydrogen peroxide. It also demonstrated metal-chelating and reducing properties. To assess its effect on lipidperoxidation, the extract was tested using the TBARS assay on young and aged rat brain mitochondria. CRRE was found to prevent lipid peroxidation in the mitochondria, particularly when induced by FeSO₄- ascorbate, in a dose-dependentmanner.

1. Anti diabetic activity (29,30):

The antidiabetic effects of \*Cyperus rotundus\* were tested in rats with alloxan- induced high blood sugar. When rats were given 500 mg/kg of the extract daily for seven days, their blood sugar levels significantly decreased. In another study,rabbits with induced diabetes were given 2.5 ml/kg of a 10% aqueous decoction of the tuber. This also lowered their fasting blood sugar levels, with the hypoglycemic effects becoming more noticeable after one week of treatment.

Additionally, an ethanolic extract of \*Cyperus rotundus\* rhizomes (CRRE)were tested on both young and older rats to study its effects on age-related changes in blood sugar. When 500 mg/kg of CRRE was given daily for 30 days, it prevented the increase in bloodsugar observed in older rats, maintaining normal blood sugar levels.

CONCLUSION

A variety of mouthwashes can be prescribed depending on the oral diseases. The current liquidherbal mouthwash may be really effective in assisting people to get rid of foul breath and other oral health issues. Pongamia Pinnata is rightly called as Biodiesel plant, being Considered as excellent source of Biodiesel. the Pongamia pinnata plant is used for Anti- inflammatory, analgesic a, anti-diabetics, anti- cancer, anti- diarrhoeal, anti-ulcer, and anti- oxidant, antibacterial andantimicrobial activity.

The review of Cyprus rotundas discusses the chemical constituent, pharmacological and therapeutic effects of Cyperus rotundus as promising herbal drug because of its safety andeffectiveness.

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